THE

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OF

GAS LIGHTING,

WATER SUPPLY,

Etc.

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THE JOURNAL OF GAS LIGHTING
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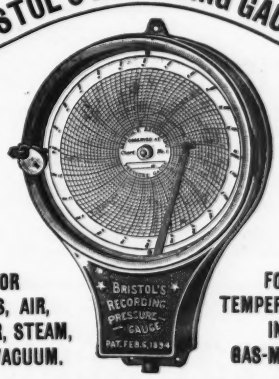

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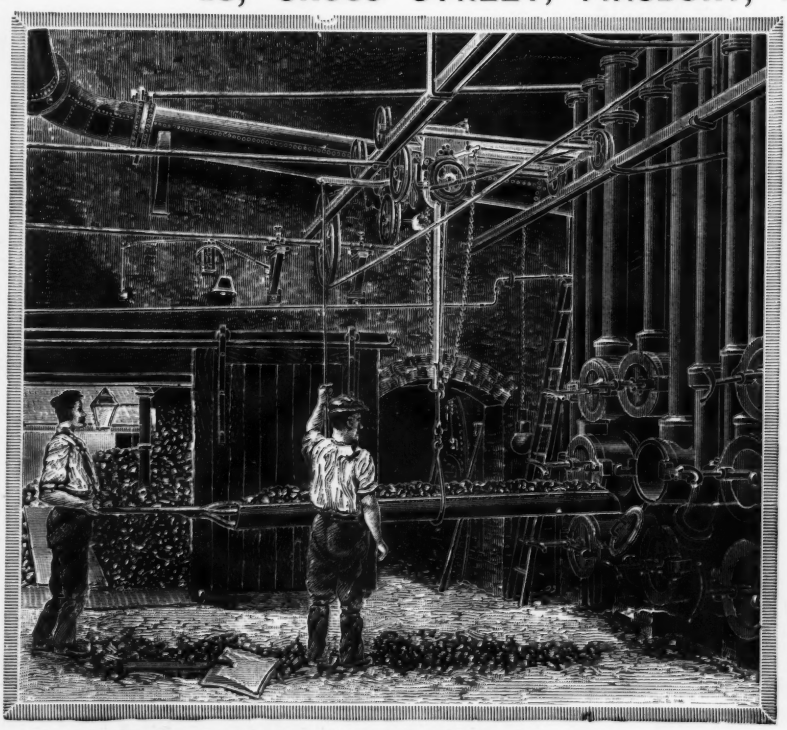

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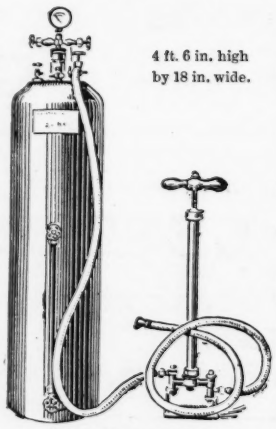

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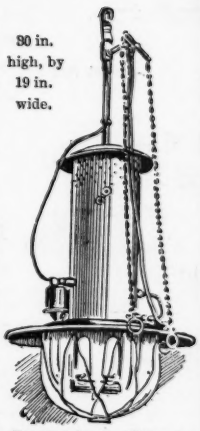

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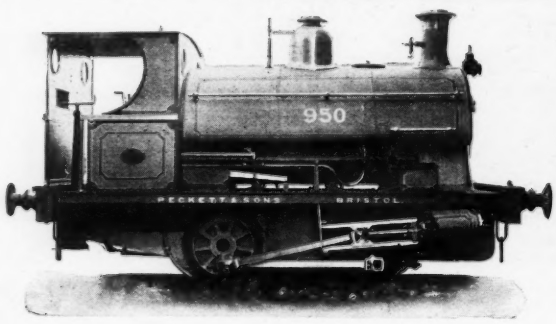

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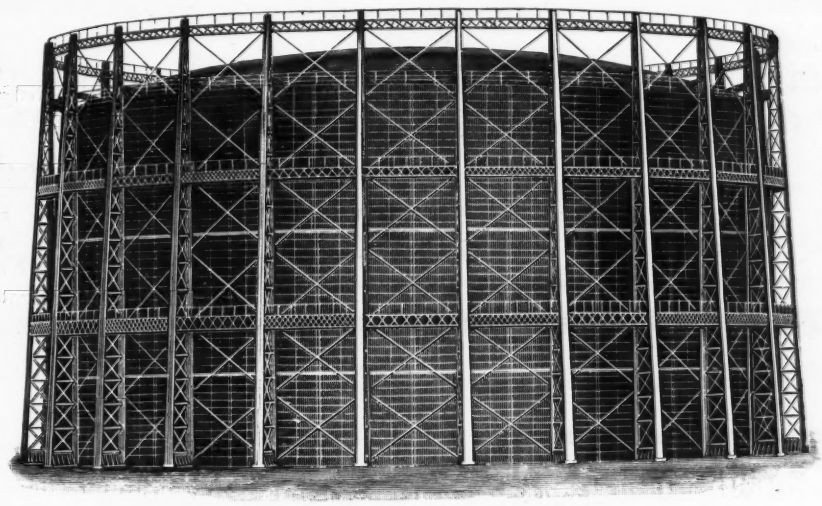

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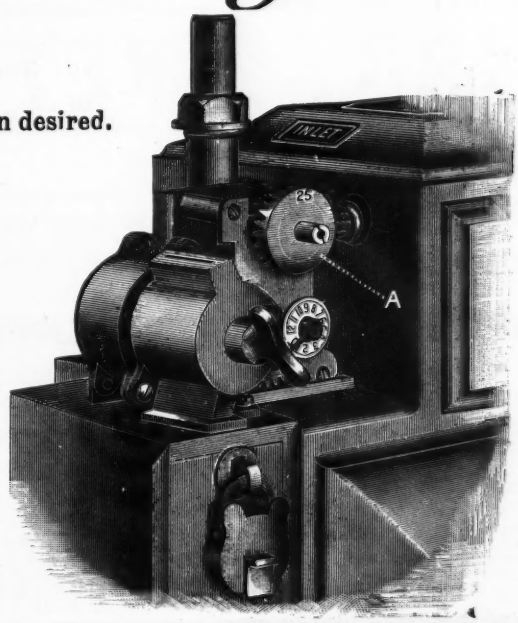

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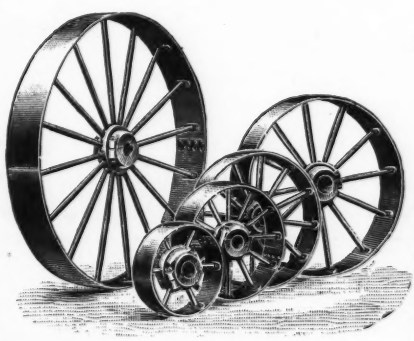

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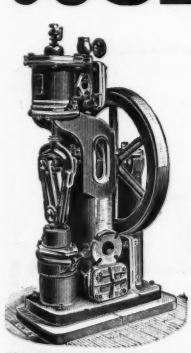

Fig. 705. "SINGLE RAM" STEAM-PUMP.

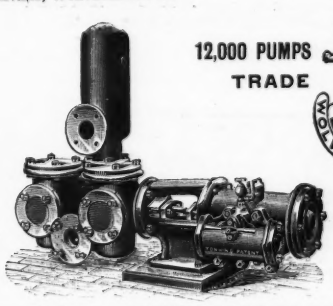

Fig. 598. "CORNISH" STEAM-PUMP FOR BOILER FEEDING, &c.

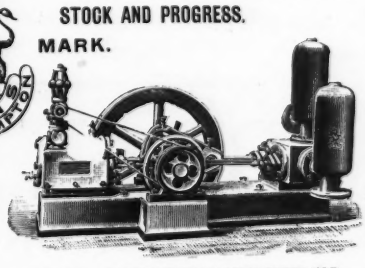

Fig. 685. "RELIABLE" STEAM-PUMP FOR TAR AND THICK FLUIDS.

Fig. 712. "DOUBLE-RAM" STEAM-PUMP.

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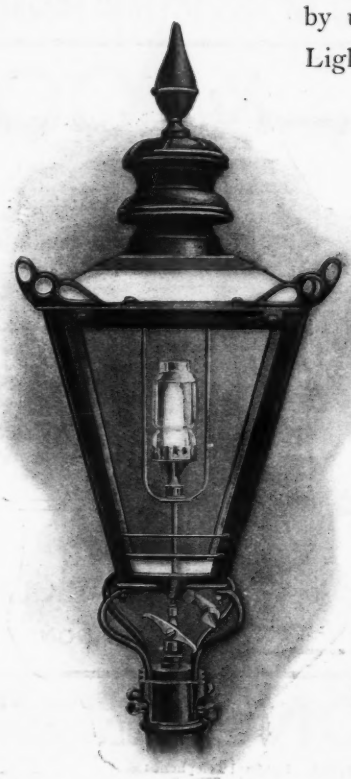

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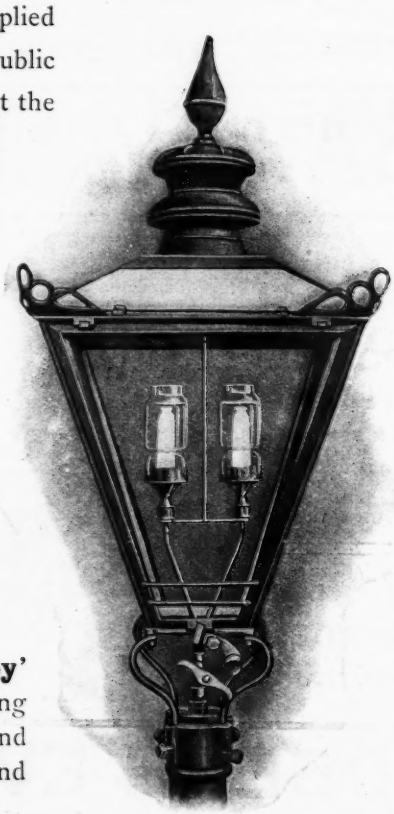

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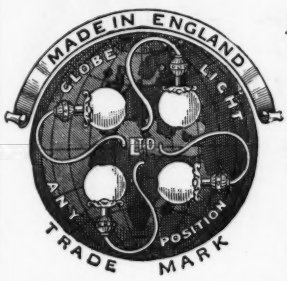

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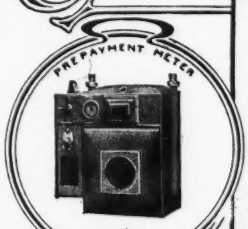

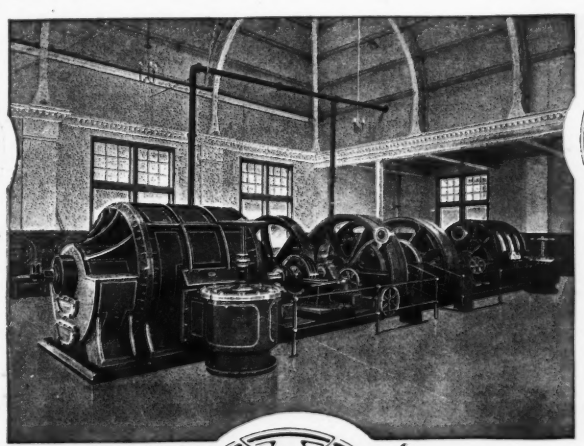

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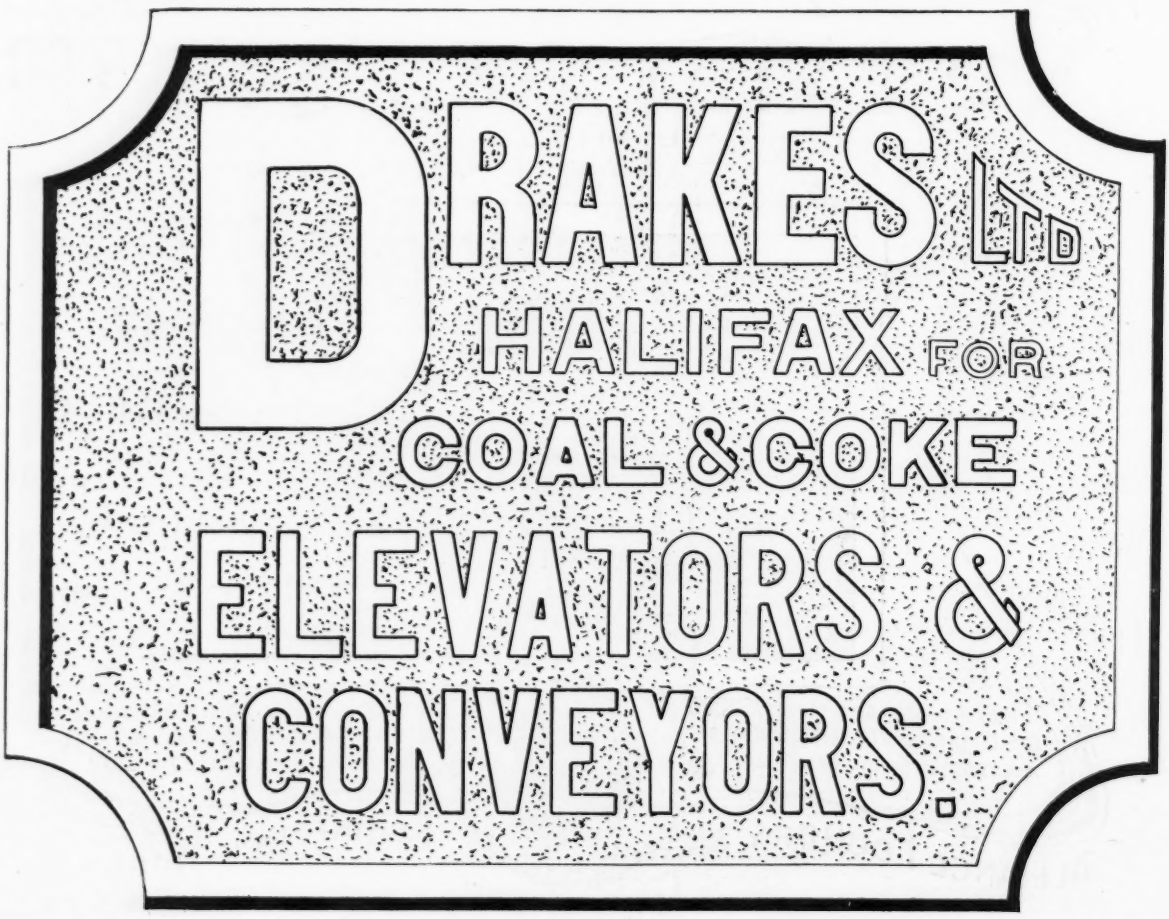

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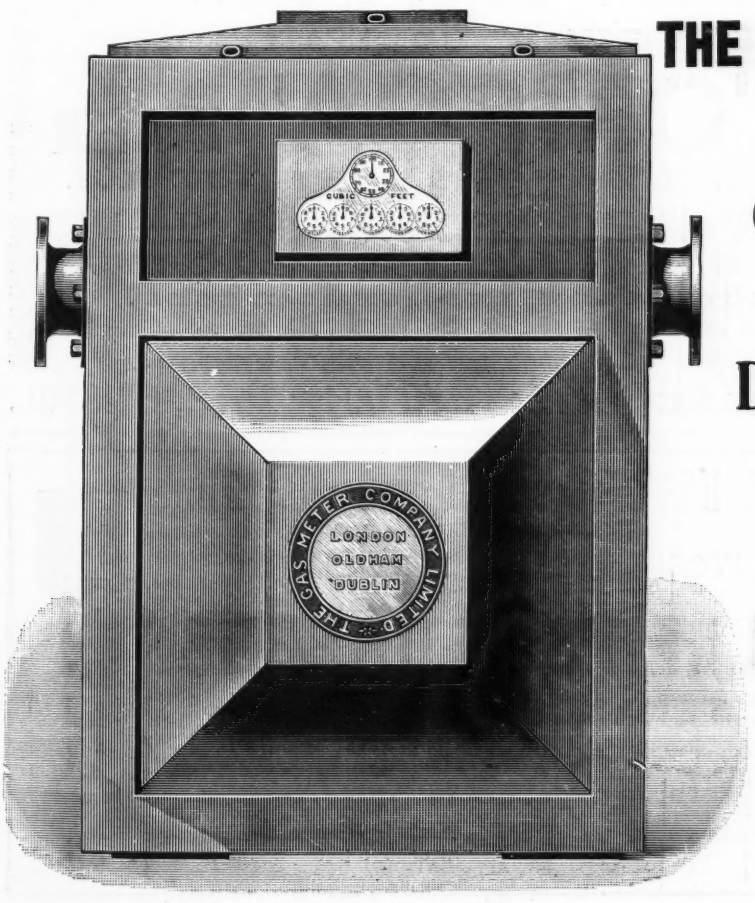

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CONTENTS.

EDITORIAL NOTES.

GAS, &c.—
Features of the Gas Acts 13
Naphthalene and Gas Profits at Leicester . 14
The Meeting of the North of England Gas Managers' Association 14
Trade Unions and the Premium Bonus System 15
The Treatment of Corporation Officials—Illuminating Power at Nottingham—British Gas Engineers in America—The Fees of Arbitrators—Pushing Business at Newmarket 16

ESSAYS AND REVIEWS.

The Colson Patent Process for Removing Naphthalene from Illuminating Gas . . 18
Gas Acts for 1904 20
The Provan Gas-Works of the Glasgow Corporation—Fourth Article 22
Electric Lighting Memoranda 26
Gas Stock and Share Market 27

TECHNICAL RECORD.

North of England Gas Managers' Association—Half-Yearly Meeting at Harrogate—
General Business 28
Inaugural Address of Mr. E. E. J. Anderson 28
Description of the Harrogate Gas-Works . 30
A Gas-Fire Burner 32
Scottish Junior Gas Association 33
The "Star" Miniature Arc Lamp 35
Steam Heat with Gas Fuel 35
Irish Association of Gas Managers—Annual Meeting in Armagh—
Mr. G. Airth on Keith's High-Pressure Lighting in Dundalk. 36

TECHNICAL RECORD (*continued*)—
Large Outdoor Incandescent Lamps . . . 40
Testing Commercial Benzene 40
German Novelties in Retort-Settings . . . 41
Temperature in the Manufacture of Gas . . 42

REGISTER OF PATENTS.

Treating Tar for the Elimination of Water—Oppenheimer, W., and Kent, T. O.. . . 42
Producing Poor Gas Free from Tarry Matters—Boutillier, L. 42
Laying Gas and Water Mains, &c.—Hayes, R. T. 43
Generating Water Gas from Small and Dust Coal—Wesselsky, L. 43
Rotary Pumps, Blowers, &c.—Hofe, L. von . 43
Increasing the Intensity of the Incandescent Gas-Light—Lake, H. H. (Gesellschaft für Flüssige Gase Raoul Pictet and Co.) . . 43
Producing Mixtures of Gas and Air—Aktiengesellschaft für Selas-Beleuchtung . . . 44
Patent Notices 44

CORRESPONDENCE.

The Telescopic Coke-Discharging Ram . . 45
Company *v.* Municipal Management . . . 45
The Merits of Carburetted Water Gas. . . 45

MISCELLANEOUS NEWS.

Gas, Electricity, and Water at Leicester—A New Naphthalene Remedy 46
British Gaslight Company, Limited . . . 47
Alliance and Dublin Consumers' Gas Company 48

MISCELLANEOUS NEWS (*continued*)—
Nottingham Gas Supply 48
Farnworth Gas Company's Jubilee—Important Developments 49
The New Chairman of Messrs. Willey and Co. 50
The Lighting of Ormskirk Workhouse. . . 50
The Public Lighting of Norwich 50
Metropolitan Water Board 51
Notes from Scotland 52
Current Sales of Gas Products 54
Coal Trade Reports 55
Stock and Share List 58

PARAGRAPHS.

Slot-Meters and the Supply of Coppers—The Retort-House Travelling Platform . . . 21
Personal. 27
French Hard Glass—The Charging Machinery at the Hanover Gas-Works 35
Pyridine Bases. 41
Promotion of Joint-Stock Companies Last Year — Supply of Bye-Product Gas at Duluth (Minn.)—Alloys of Rare Earths for Ignition and Lighting 42
Concession to Large Consumers at Dorking . 46
Spontaneous Combustion of Coal—The D'Heureuse Mantle—Gas and Water Works Extensions for Abergavenny—Extension of the Torpoint Gas-Works—Leamington Priors Gas Company—Gas Supply in the Clayton West District—Theft from a Prepayment Meter 56
Reduction in Price at Leatherhead—Disturbance of Streets by a Gas Company—The Proposed Incandescent Lighting of Bath Streets 57

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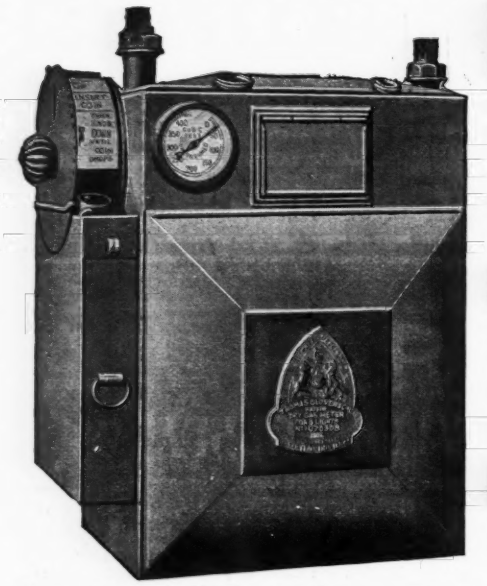

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EDITORIAL NOTES—GAS, &c.

Features of the Gas Acts.

RELATIVELY, the past session of Parliament was a dull one in regard to gas legislation—measured quantitatively and by the amount of contest that was carried on before Committees. Things are prone nowadays to work a little more smoothly than was their wont a few years since; both promoters and opponents recognizing that a full pound of flesh may be purchased too dearly by waging war on each other to the extreme end. The signs so far do not give any great hope of the next session producing a large number of applicants for extended powers. Politically, the position is too unsettled; and there is yet the Board of Trade Committee's report to be finally composed. Considerations such as these may deter those who are able to do so to put off an application to Parliament until the atmosphere is cleared. But dull as last session was, it yielded its lessons, precedents, and influences, which will be brought into play in future, and so must be taken into account.

Our summary is completed elsewhere to-day of the pronounced features of the Gas Acts of Company origin; those referring to local authority undertakings and a few miscellaneous ones will receive treatment next week. Of the former, however, we may now take stock, to ascertain the trend of events. Concerning first the question of capital, it is noticeable that several companies have taken the opportunity of an application to Parliament to make their financial position better "understanded of the people," and to facilitate dealings in stock, by converting and consolidating their capital on a 5 per cent. basis. In respect of the amount of additional capital allowed, Parliament has not been by any means ungracious; but, associated with this, it is a curious thing that so few companies seem to recognize the advantage of securing the right to first offer new issues direct to gas consumers and employees. In the large balance of companies, there are those who have gained authority to so offer portions of issues that are unsold by the old prescribed procedure of submitting new capital to auction or tender.

The favourite standard illuminating power is 14 candles; and in the present batch of Acts that figure is almost the rule. The exceptions are rare. But the unsettled conditions in regard to the testing of gas of this description are impressed by the dissimilitude of methods. Honours are about equal between the "Wandsworth" or Sugg's 14-candle argand burner and the South Metropolitan system of consuming the 14-candle gas in the "London" argand No. 1 burner at such a rate as will give a light of 16 candles. Instances are found, too, in which it is precisely laid down—following the Gas Referees' "Instructions"—that the last-named burner shall be used with a 6 in. by $1\frac{3}{4}$ in. chimney; but so long as the gas-flame rises above the top of the glass, a 6 in. by 2 in. chimney shall be employed. The inquiry by the Departmental Committee has been responsible for certain Provincial Companies having to submit to the method of testing the gas that may be, as the outcome, prescribed for the Metropolis. Two Companies have specially ensured the use of the Harcourt 10-candle pentane lamp, with table photometer. In conjunction with reductions of illuminating power, concessions have had to be made in respect of the standard price; and, in the same connection, the new and fair arrangement for shareholders of making the sliding-scale operate on half-yearly changes of price has had a considerable adoption. Speaking of the price of gas, brings us to the debateable question of discounts, on which it is difficult to form any conclusive opinion as to what, if any, is an allowable latitude. Under the changed circumstances of the times, it is preferable that there should not be any gyve upon the business of gas supply, but that every undertaking should have full commercial freedom. However, there is certainly an amplitude of range for bargaining in the 25 per cent. discount—not exceeding 10 per cent. for prompt payment and 15 per cent. for large consumptions—permitted in the case of several undertakings. In the Corbridge Act, even this limitation is not imposed—15 per cent. being permitted for prompt payment, and rebates to large consumers are left open to agreement. The latter liberty has also been granted in one or two other cases. That views are, however, divergent in this matter is seen by the variations of the foregoing terms—a total of 10, 15, or 20 per cent. being considered sufficient scope by certain undertakings.

The conditions for prepayment meter supplies received a large amount of attention. The Chippenham precedent of 10d. excess on the ordinary price per 1000 cubic feet for a coin meter and fittings, 1s. when a cooker is supplied, and 6d. for a prepayment meter alone, came too late in the session to have any substantial effect. Several companies had gone in for the previous latest precedent—the Metropolitan or Derby terms, of 10d. for meter and fittings and 10 per cent. on the cost of a meter supplied without fittings. Further variations are found in the Bexhill Act, in which the Company have obtained the right to charge 1s. extra for the "meters and fittings used therewith," and 10 per cent. on cost for meter alone; and in the Sutton Act, where the prescribed excess is 10d. for meter and fittings, "provided always that the Company shall be entitled to "charge 1d. for any less quantity than 100 cubic feet." But the Southend Gas Company are contented with more modest terms on the lines of the Chippenham clauses. In this instance, only 8d. extra was requested for meter and fittings, 1s. when a cooker is installed, and 4d. for a meter alone. This is rather low, but apparently not too low for Southend. It may be expected that the future will see a greater uniformity on the basis of the Chippenham clauses. Before leaving financial questions, the session has established the custom of asking for a renewal fund to the extent of 10 per cent. on the paid-up capital, to be built up by 1 per cent. appropriations from the revenue annually, or else by $\frac{1}{2}$ per cent. bi-annually. The Sutton Gas Act supplies an exception to the rule, with one-twentieth of the paid-up capital as the maximum of the fund.

Turning to miscellaneous matters, two Companies have changed their names, the Crystal Palace District to the South Suburban Gas Company, and the Colney Hatch to the Southgate and District Gas Company; while the Croydon Gas Company is an abbreviation of their old and cumbersome title. The first-named Company have also secured to their employee stockholders the right, on terms, to representation in the management of the Company's affairs. Special notice was taken last week of the power-gas clauses of the Matlock and District Gas Act. Certain companies, too, have obtained authority to apply for electricity supply powers. Three or four companies have made it compulsory that one or both of their auditors shall be professional accountants. This is a course to be approved in businesses of such a special character. It is lamentable to see the small regard that is paid by some companies to the selection of auditors from among the shareholders, which results in many men being put in the position who have no more knowledge of gas accounts—excepting their own private quarterly ones—than the men of the Seventeenth Century. The directors of certain companies have secured authority to determine the salaries of the secretaries, instead of going through the farce of submitting the matter to meetings of shareholders. It is a noteworthy feature, as touching upon recent legislation, that County Councils are commencing to agitate respecting the depth at which gas-pipes are laid, and are calling for regulation. In two Acts, it is ordained, at the instance of the Herts County Council, that gas-pipes in future, in the area over which they have jurisdiction, shall not be laid at a less depth than 2 feet to the upper surface of the pipe; in the Chippenham Act, the Wilts County Council are exempted from liability to damage, by their steam-rollers or other road engines, to pipes laid in future at a less depth than 2 ft. 6 in.; and the Barnard Castle District Council are not to be answerable for damage to pipes with their surfaces at a less depth than 2 feet below the roadway. But in these cases it is believed that all the clauses were inserted by agreement.

Naphthalene and Gas Profits at Leicester.

ANOTHER "solution" of the naphthalene difficulty is to-day before the gas industry; and this time it is Mr. Alfred Colson who cries "Eureka." All gas engineers will hope, and most sincerely hope, that Mr. Colson is not doing so prematurely. So many have been the specifics, and so many their inopportune failures, that scepticism in this particular matter has long since obtained an ascendency over belief. The new remedy, the lightening (real or fancied) of the trouble, and then the mockery of a crop of fresh troubles—these are some of the experiences of the past; and they have had a withering effect on belief in any fresh suggestion really being the panacea. But when Mr. Colson says he has found what many for so long have been looking for, hope is revived, because he is not the man to make such a claim without substantial reason. It had been whispered that he had met with extraordinary success; but until last Tuesday there had been no special public allusion to it. There was mention by Sir Frederick Mappin, at the recent meeting of the Sheffield Gas Company, of a process of which he was "sanguine something would come;" and this, it is understood, referred to the Leicester system. It, however, properly fell to the Chairman of the Leicester Corporation Gas Committee to publish the first precise information on the new cure, when he was laying the usual half-yearly accounts before the Town Council last Tuesday; and, to say the least, his statements are remarkable. Leicester has had its full share of the embarrassments and burdens imposed by the ubiquitous enemy of the gas manager; and these troubles have been more pronounced in the past fifteen years than they were formerly. Like so many other gas engineers, Mr. Colson has applied what were hoped would be remedial measures, and has sought for new ones. Fortunately, want of success did not make him despair. He has been confident of eventually attaining success; and now, has he secured it? It is confidently believed by all interested at Leicester that he has; and they have the support of the experiences since the system was first put into operation. This was in the middle of May last, when the town was "most free" of naphthalene. Though previously it was no uncommon thing for the Gas Department to have from 100 to 600 complaints per day of stoppages through naphthalene deposits, the average of complaints has been only about fifteen per month since; and—this is particularly noteworthy—these have occurred in the district supplied from the old works, where the treatment has not yet been applied.

Some sceptical folks will look for other causes for the effect. But against supposition and theorizing must be advanced the fact that, while just recently many gas undertakings have again been suffering from fresh outbreaks of the nuisance, in the district (which is the major part of the borough) supplied from the Aylestone Road Gas-Works, where the new process is in use, there has *not been a single case* of naphthalene for months past, instead of some hundreds daily—and this by treating only some 55 per cent. of the gas. It is wise at times even to err on the side of caution; and so, notwithstanding this experience, we will not commit ourselves at present to the definite statement that here is the ultimate and universal cure. There will have to be greater experience throughout the seasons, and under the varied conditions of several places, before this can be said with full confidence. There is, however, no doubt that Mr. Colson completely believes in his system; and this is a material point in its favour. We have before us, too, figures which form a solid foundation for his belief. Information also reaches us that there are other gas engineers who have been highly impressed by the system, and by the deliverance of Leicester and Mr. Colson from a terrible load of anxiety during the months that it has been in use. Something else that will also produce an impression is the fact that it is estimated that the new remedy will have the effect of adding at least £5000 to the profits of the Gas Department. Now that this testimony is out, Mr. Colson's professional friends will want to know what is this process that is believed to have solved the puzzle; and, by the aid of the inventor, we are in a position to give the information in another part of this issue. It is a commending feature that both the initial outlay for the apparatus required and the working cost are quite insignificant. There appears to be no doubt that Mr. Colson has hit upon something entirely different from anything that has hitherto been on the market. For several years past, he has been working in the direction of obtaining relief by utilizing creosote; believing that success would ultimately lie that way. But it should at once be made clear that the solvent he now employs is *not* a creosote, neither is it any other up to now commercial product. But for further information, reference must be made to the special article elsewhere. If this process is the solution, and if it can be applied in all places and under all conditions with the beneficent results experienced at Leicester since May, and in other towns where it has been tried, then, indeed, will Mr. Colson have achieved one of the greatest triumphs of his professional life.

On the results of the working of the past half year, the Gas Committee and their General Manager and Engineer must be complimented. The balance carried to the profit and loss account is £47,638, which is an increase of no less than £6289 compared with the corresponding half of last year. Of course, the accounts cover a period in which the sales of residuals have been good, and in which coal has been at an easier price; but these propitious circumstances would not produce such results as Leicester has enjoyed unless they were supplemented by good service. The Chairman of the Committee recognized this fully in his address to the Council. But, on the other hand, good service and the strictest application to business by Mr. Colson and his staff will not, we are afraid, be able to maintain such a high record of success in face of the cloud of depression which, it is apparent, is drawing over the trade of Leicester, and not only over Leicester but over the country generally. Residuals, too, are not looking at all promising for the immediate future. Whereas the Committee were able to get 12s. 6d. per ton for their coke in the six months covered by the accounts, they are only able at present to command 8s. 6d. Furthermore, the popularization of gas in the borough has, so the Chairman of the Gas Committee states, been carried to such lengths that "almost every householder "is at the present time a consumer." If this is not merely a picturesque way of saying that the department is doing a flourishing business, we hardly know whether or not to congratulate the Committee. Of course, it is a fine thing to be in the enjoyment of the maximum possible business, but it is also good to have fresh fields to conquer in order to keep active such energetic spirits as the Leicester Gas Department possess. However, with such an increment in the gas receipts as Leicester had last half year, we are not disposed to think that the time has already arrived when it must be declared that the undertaking has reached the zenith of its prosperity.

North of England Gas Managers' Association.

THE meeting of the North of England Gas Managers' Association on Saturday was lacking in those technical ingredients which give the proceedings on such occasions an after-tone of quality. Nothing was wanting on the part of the Harrogate Gas Company and their Secretary and Engineer (Mr. Harry Wilkinson and Mr. G. S. Sayner) in the way of hospitality and other services which spread through an assembly of the kind a sense of cordial welcome, and make the visit memorable among the participants. The only thing which the members contributed towards making the occasion a success was their presence. This was perhaps the only thing that could be expected; for Harrogate has many inducements to an inclination for enjoyment of the place for the time being rather than for indulgence in the, by contrast, prosaic discussion of technical matters. And gas men are not by any means adamant to the very human desire to have a share in the amenities of life in company with their professional friends. The excuse is a legitimate one, certainly, if it is not applied too frequently, to the injury of the fundamental objects of such associations of men.

The only item in the programme partaking of a technical character was the address of the President (Mr. E. E. J. Anderson); and it was in keeping with the rest of the proceedings. It was not burdensome in length. It was pithy, and composed in a free and light style which added to its interest. It showed, too, without any vain pretentiousness, that the Middleton Corporation have in the President a Manager keenly alert to the opportunities for developing their gas business, and, of equal importance, one whose works' results are of the order which testifies a watchful care. On none of these matters can points be found for criticism; and it is only in certain of the general introductory

topics that some of those present could, no doubt, if presidential utterances were not exempt from discussion, have joined issue with their President. He, however, almost invites criticism when he poetically exclaims: "I'll not "willingly offend, nor be easily offended." Good! Then we may venture a few observations. Carbonizing, Mr. Anderson very truly asserts, is the most important of a gas manager's duties; but he is afraid "it is one of the most "neglected, as it is far too much left to subordinates." He does not state his grounds for this sweeping assertion; and we fail to find them. The accusation of neglect does not by any means harmonize with the statements of high yields per ton that are advanced at meeting after meeting at which the accounts of gas companies and gas committees of local authorities are presented, nor with the published analyses of working results. To obtain the highest possible results from the carbonizing system at command, the President advises that each manager should spend "several hours every day" in the retort-house. Whether the President practises what he preaches, is not common knowledge. But we have our doubts, which are increased when light is thrown, later on in the address, on the activity which is displayed at Middleton outside the retort-house, and without any disparagement to the excellent carbonizing results achieved there. Underlying the advice there may be wisdom; but there are very few managers, no matter how much the spirit is willing, who could afford to allocate to the carbonizing operations several hours of "every day" of their working existence.

Although not said in so many words, the President further suggests that the published experiences of different engineers with different carbonizing methods should pass unheeded, owing to the difficulty, through their disparity, of forming an opinion from them. This surely is not the way to attain to the highest perfection, nor the way to mould independent judgment. Were a man to confine himself exclusively to "the system he has at command," neither that man nor his works would ever have part in the work that has progress for its sole aim. The disparity has its cause, and in most cases the cause is ascertainable, if only it is subjected to thorough investigation by available means. To "local cir-"cumstances" may be largely attributable the condemnation that comes from one quarter of plant that is successful in another. But "local circumstances" are sometimes made to cover a multitude of sins and prejudices; and it is impolitic to ascribe too readily to that convenient and ample cloak, all responsibility for failures and unpleasant experiences. Again, in publishing the results obtained with different systems, the President would be content to have the candle-feet per ton from practical working and laboratory tests. No carbonizing system could be accepted or condemned on any such fragile evidence. Candle-feet per ton is not the only consideration. It may give an indication of the quality of a coal; negligent or imperfect working of the plant might even hide it. To the produce of the coal properly carbonized must be conjoined the working costs, if a complete comparison of efficiency is desired, as a high yield of candle-feet may be in some cases expensively obtained. With the President, we are agreed, and have long been convinced, that what is desired in this connection is some fixed basis for comparison. Perhaps, however, in these particulars, Mr. Anderson does not mean precisely what, under the head of carbonizing, he conveys; for in the succeeding lines he is found saying that, "at the present time, every manager, engineer, or director "needs his keenest faculties to be able to advise his com-"mittee as to future extensions." How anyone is to do this without digesting the published information on the various carbonizing systems, supplemented by research that cannot be made in his own retort-house, we will not attempt to divine.

There is only one other point in the President's address to which we can here direct attention, and that is his remedy for inadequate remuneration in the gas profession. His proposal amounts to the standardization of salaries according to the size of works, "following the lines of the other "professions." We must confess to ignorance of any such lines having been adopted in kindred professions, and should like to be enlightened. Judging from the special organs of other professions, the grievance of the gas engineer and manager in this respect is common to all. The fixing of a scale of pay for various sized works as proposed, though it may only be a friendly understanding, would not, we feel certain, tend to the pecuniary advancement of the fittest, but would act as a certain check. The Trade Union principle of fixed wages (for that is what the idea amounts to) cannot be applied to professional positions and responsibilities which are dissimilar practically in every town. It may be true that the remedy for the state of things in regard to insufficient remuneration for services, which exists more extensively than is pleasant to contemplate, is largely in the hands of gas engineers and managers themselves. The state of things, of course, does not enhance the dignity of the gas companies and corporations who, in their strength, have produced it; but it is not every gas manager who can unaided afford to hold out against that strength and the stress of competition. The President must, we fear, look around for an alternative suggestion.

With regard to the general proceedings, it need only be observed that the day was marked by the most cordial recognition of the Association by the Directors of the Harrogate Gas Company—represented by their Acting Chairman (Mr. F. Barber) and Mr. Wilkinson and Mr. Sayner—and by the town authorities. The Mayor found time, among his many duties, to attend the luncheon to which the members were invited by the Gas Company; and his kindly and humorous speech after his health had been proposed, was greatly appreciated by all present—showing as it did that the good work being done by the Association is known and recognized at its real value at the very boundary of the district covered by the labours of the members. A considerable number of the party visited the gas-works in the course of the day; and they and other readers will be interested in the illustrated description of them appearing elsewhere.

Trade Unions and the Premium Bonus System.

THE recent denunciation of this system by a Committee of the Engineering and Shipbuilding Trades Federation is somewhat of a surprise to those who judged of its suitability to modern labour conditions from the satisfaction which it has apparently given to the Amalgamated Society of Engineers since its introduction at Glasgow in 1893, and its formal adoption by a provisional agreement between that body and the Engineering Employers' Federation in 1902. It must, however, be borne in mind that these two Trade Unions are separate and distinct; the one representing modern Trade Unionism, and the other—namely, the Amalgamated Society of Engineers—being the old Trade Union, having no longer any representation at all on the London Trades Council, and taking no part in the annual Trades Congress. Apart, therefore, from the merits of this particular case, some development of antagonism between the two bodies was almost to be looked for; but that this should take the form of an acute difference of opinion upon a question of vital importance to the industry of the country is to be deplored. The Amalgamated Society of Engineers, be it said, numbers an effective membership of 83,897, and includes practically the whole of the fitters and turners in the country. The other Trade Union is, as its name implies, a federation of all trades connected with engineering and shipbuilding, and numbers 239,992 members, of which perhaps the most influential are the boiler makers, numbering 48,658, and the shipwrights, who number 19,319 in all. Whether every trade in the Federation is equally opposed to the premium bonus system is not clear. So far nothing has been done by the General Executive beyond recommending all the federated societies to do all in their power to prevent their members working under any scheme of the kind.

The system against which the New Trade Unionists have so strongly set their faces may be briefly described as one under which the skilled and industrious workman is enabled to earn more than one who is either less skilled or is less industrious, or both. This, however, needs some amount of qualification. Piecework, it may be said, also favours the skilled and industrious workman; but the premium bonus system differs from piecework because under it the workman receives remuneration according to the time saved, instead of in direct proportion to the work turned out. In principle this may mean very much the same thing; but in practical effect upon the wages of the workman there is a difference. Under a piecework system, the workman receives all that he earns, and neither more nor less; but under a premium bonus system, he is first of all ensured his full rate of wages, and receives in addition a large portion of the time which he may be enabled to save upon the job. To each job certain time is allotted by the management, it being understood that for all time saved the workman will receive, in addition to

his wages, a proportion of the saving effected. If no time be saved, or if time be lost, the full ordinary rate of wages is nevertheless paid, although it is conceivable enough that as regards the latter steps will be taken by the management to render its recurrence as infrequent as possible. Under what is known as the American system, the workman receives a certain percentage of the value of the time saved; while under the Rowan or Scotch system his wages are increased by an amount bearing the same percentage to the standard rate as the time saved bears to that allowed. Thus, if a workman whose time is rated at 10d. per hour saves two hours on a job for which ten hours are allowed, he receives his 10d. per hour for the eight hours worked, *plus* one-half or one-third of the 20d. saved, according to the American plan, or, according to the Scotch plan, 20 per cent. of the saving—viz. 16d.—in addition to his eight hours at 10d. The other portion in each case goes to the employer.

It is this system that is now opposed by the Committee of the Engineering and Shipbuilding Trades Federation as having "absolutely nothing to recommend it." They say: "It is an adaptation of the most pernicious and degrading "condition of employment in modern industrial history—the "task-work system; it creates jealousy and ill-feeling in the "workshop, and is the cause of endless bickering and mis-"understanding, owing to the complicated and intricate "character of the calculations involved in many systems; it "has been the cause of more men being discharged than any "strike which has ever taken place in the history of engineer-"ing or shipbuilding trades; and it will have the effect of "keeping men whose waning physical powers unfit them for "the closest and hardest labour from obtaining employment "except when trade is at its busiest." For the unnecessary —and, it may be added, unconvincing—violence of this denunciation some allowance should be made, as being the outburst of men who have not been accustomed to measure their words, who find themselves threatened with an innovation which does not accord with some of their most cherished modern tenets, and in whose breasts perchance there rankles the conviction that they are in opposition to a great nnmber of their fellow-workers, who have tried, and approve of, the scheme they reject.

Disregarding, then, the extravagant terms in which it is couched, is the indictment based upon substantial grounds? That the system may be the means of weeding out the incapable or idle workman is probable enough; but little sympathy need be extended to one who, after suitable training, is either unable or unwilling to make himself worth the standard wage. It is otherwise with the industrious workman who with failing powers finds himself unable to maintain his place in the ranks. But it is not the fault of the employer that such men must give place to the more capable. His intent and desire would be to pay each man according to his merits and skill; but this he is in a measure prevented from doing by the fixing of a standard rate of wages. To the general question of the suitability of this system, the answer would seem to be supplied by the Amalgamated Society of Engineers. One would think that a system which satisfies them cannot have very much the matter with it. They are a body of men with the reputation of being by no means unmindful of what they conceive to be their interests, and not a little jealous of maintaining them. An instance of this has just been afforded by the unfortunate position created at Messrs. Yarrow's works by their refusal to accept time-and-a-quarter instead of time-and-a-half for night work. This has necessitated the execution abroad of an important contract which might have found employment for many English workmen during the coming winter. These men, however, are in favour of the premium bonus system. This seems to be clear from a clause in their agreement of 1902 with the Engineering Employers' Federation, which provides that "no firm shall establish the bonus system without in-"tending to adhere to it," under which an appeal is at the present time pending to the National Conference of the Employers' Federation and the Amalgamated Society of Engineers, from the workmen of a firm which desired to abandon the system after having tried it for two years. The system may not be an ideal one, and, like every human institution, is probably capable of improvement. But it seems to be better than piecework, seeing that the tendency of piecework prices to become less increases with the skill of the workman, for this is a temptation to the employer to reduce rates; whereas under the premium bonus system the agreement already referred to provides that when once fixed the time-limit is not to be altered. It is at the same time a means whereby cost of production can be reduced with positive gain to the workman—a matter of no small importance in these days of excessive competition.

Are, then, the ostensible reasons given for the opposition of the New Unionists the true reasons? Is it not the fact that they think, by keeping all workmen on a level as regards work and wages, to find employment for a greater number? Do they not aim at restricting output, unmindful of the economic law that such restriction must mean greater cost of production, and consequently less trade? It must not be overlooked, too, that Trade Union officials look askance at any scheme which is likely to knit together the interests of employers and employed, and, as a natural consequence, weaken their hold upon the latter. The opposition of Trade Unions to that most beneficial of all plans for the improvement of the lot of the working man—the South Metropolitan Gas Company's profit-sharing scheme—is a matter of history. They did their best also to prevent the adoption of a similar scheme at the Commercial Gas Company's works; but the men threw them over. So, it is to be hoped, will some of the Federated Societies throw over the advice of their Executive Committee. The system in question is a step to co-partnership, although falling a long way short of it, inasmuch as it fosters individual, and not the common, interest, and the habit of earning, but not that of saving. Out of much less promising material, however, have been evolved ere now the most gratifying results; and conferences of reasonable men on both sides might lead to important further developments. That which is so often termed the industrial warfare waged between capital and labour is largely due to a misunderstanding of each other's aims and objects, which it must be the desire of everyone to dissipate. The Trades Congress has been called the "Parliament of Labour." Why should there not be a "Parliament of Capital and Labour"?

The Treatment of Corporation Officials.

Mr. S. Norbury Williams, who has been contributing a series of articles on municipal extravagance to one of the local papers, this week deals with the salaries paid to the officials of the Manchester Gas and Water Departments. The principal names and amounts are tabulated; and naturally, considering the magnitude of the business, they make a goodly list. It seems, however, that it is with regard to the payment of the collectors only that Mr. Williams has complaint to make. This duty is undertaken, for the Gas Department, by some forty gentlemen, who last year received for their work £7846—£764 of which was paid by the Electricity Committee for the collection of their accounts. A sum of £7082 thus remained, to which had to be added the salaries of the cashier, assistant-cashier, office receivers, &c., which gave a total of £9130 as the cost of collecting, on gas-works account, an amount of £743,963. Four of the gas collectors are, it seems, in receipt of salaries of £300 a year; and it is this fact that has most worried Mr. Williams, who cries aloud for economy. The Water Department employ seventeen collectors, whose salaries amount to £3361, while the total receipts last year were about £313,000; and the writer of the article concludes by asking whether any of the ratepayers of Manchester are aware of a case in the city in which a business house employs two sets of collectors to get in the money owing to it, and also whether it pays £300 yearly to any one of its collectors. Whether or not an answer to this query will be forthcoming, we cannot say; but what we can confidently assert is that these public discussions of the salaries and duties of officials do not add to the attractiveness of employment under a corporation.

Illuminating Power at Nottingham.

The question of illuminating power is at present occupying the attention of the Nottingham Gas Committee and their Engineer, Mr. J. H. Brown; and with a view to the further consideration of this and other matters, the latter gentleman has prepared a report, some extracts from which we publish to-day. It will be remembered that both Sir George Livesey and Mr. Brown, in the reports on the Gas Department prepared by them some time ago, recommended a reduction in the illuminating power of the gas supplied; and as the result, a drop to 16 candles was decided

upon. This change passed unnoticed by the consumers; and during the summer months a further interesting experiment was tried, in the shape of another considerable reduction. For six weeks, the complaints were far less numerous than had hitherto been the case; but unfortunately at the end of this period the matter was made public. Although by this time the illuminating power had been brought back to the normal, a shower of complaints was promptly received; and with a view to satisfying the Committee as to the soundness of their new policy, Mr. Brown has been making extensive inquiries of prominent members of the profession. The authorities at Nottingham should be reassured by the experience of the South Metropolitan Gas Company (as quoted by Sir George Livesey) on the subject of reduced illuminating power—namely, that "the consumers do not burn more gas, their accounts are not larger, the complaints of bad lights are certainly not more numerous than before the change was made, but rather less, and the public and private lighting are certainly not inferior." Sir George goes on to point out that "what is wanted is to instruct and assist the consumers to use their gas to the greatest advantage by providing suitable burners, and also by providing them with gas of uniform quality from day to day." As proving how much of the trouble is due to the employment of unsuitable burners, Mr. Brown states that a careful investigation of complaints as to the quality of the gas at Nottingham showed that in only one instance was a burner being used which would furnish half the illuminating power capable of being obtained from the gas; and this he thinks bears out Sir George Livesey's contention that what is wanted is not a higher quality gas, but better knowledge on the part of the consumers, and a more economical and efficient type of burners and apparatus. Under these circumstances, he recommends that, in addition to the inspection of gas-pipes in all buildings prior to connection with the mains (which is already being taken in hand), the Committee should arrange to send competent men to advise the consumers with regard to the best forms of burners, &c., to use, as well as to see that the gas is consumed in the most economical manner.

British Gas Engineers in America.

The party of the members of the Institution of Civil Engineers visiting America include Mr. H. E. Jones, the Ex-President of the Institution of Gas Engineers, Mr. C. E. Botley, and Mr. R. O. Thompson, of Melbourne. Professor W. C. Unwin is also among the number. In New York City, the visitors were entertained most royally by the American Society of Civil Engineers. On Tuesday, the 13th ult., there was a reception at the Society's House and a luncheon; and in the afternoon, the Hon. George B. M'Clellan, the Mayor of New York, received the company at the City Hall. A visit to the Croton Dam with lunch there, or as an alternative an excursion round Manhattan Island, were the arrangements for the second day. An excursion by boat to West Point constituted the programme for the Thursday; and the succeeding day was occupied by various visits to places of engineering interest. In the evening there was a banquet in honour of the visitors. While in New York, the three Gas Engineers mentioned above had an opportunity and the pleasure of going over the ground for the new works which Mr. W. H. Bradley has, as Chief Engineer, designed for the Consolidated Gas Company of New York; but the visitors saw that only the foundations and skeleton buildings have as yet been put in. The plans indicate a works of a $\frac{1}{4}$ mile in area, constructed in ten sections of 10 million cubic feet each. The arrangements made by the American Society of Civil Engineers caused the stay in New York City to be a great success. Excellent programmes, too, were provided for Montreal, Chicago, and St. Louis. In a letter from Mr. H. E. Jones from Montreal, he states that the reception of the travellers there was also a grand one. They were the guests one day of the Canadian Pacific Railway Company, and visited their extensive shops, which stand on 600 acres of land, cost with equipment 2,750,000$, and have 17 acres of roofing. A second day was spent in a trip to Victoria Bridge, provided by the Grand Trunk Railway. On the return journey, the Dominion Government entertained the visitors at luncheon; and, in the evening, there was a reception by the governors, principal, and fellows of the M'Gill University. The Canadian Society of Civil Engineers were most hospitable, and gave the visitors a great deal of pleasure.

The Fees of Arbitrators.

A fortnight since the fees of arbitrators formed one of the subjects of a paragraph in the "JOURNAL." The remarks then made have attracted the attention of one of our readers; and he sends us one or two "curiosities" relating to the question. It was shown in the paragraph referred to that, though an arbitrator may (if there has been no prior agreement) settle his own charges, he is not at liberty to fix an exorbitant sum, and that those interested are fully safeguarded. There is another side to the matter; and it is that arbitrators are sometimes expected to act at fees not at all commensurate with the responsibility attaching to their appointment. In (say) the matter of a gas-works purchase, it requires a man of great capacity and of knowledge of such subjects as the one the value of which he has to pronounce judgment upon. Otherwise he is not fit for the position. The riddle which is always before an arbitrator as to why Mr. A. values an undertaking at so many thousand pounds and Mr. B. at so many more thousands, is one that it is not within the power of the inexperienced to answer. Consequently, those desiring an arbitrator capable of fulfilling the responsible duties to be entrusted to him, must expect to pay a remuneration befitting the service. The "curiosities" forwarded by the engineer referred to in the opening lines, have connection with an arbitration case over the purchase of a gas-works. From a certain Government Department, our correspondent received an inquiry as to whether he would be willing to act in the capacity of arbitrator in the case. Said the letter: "the remuneration"—this settled the question so far as our correspondent was concerned—"will be £5 5s. a day, together with subsistence allowance of £1 1s. a night, and first-class travelling expenses." Seeing that the engagement would have taken this engineer on a journey of several hundreds of miles, and removed him quite out of touch with his ordinary work, he preferred not to give up his time away from home for £5 5s. a day, even with the subsistence fee of £1 1s. thrown in. He wrote to the Government Department concerned, and explained that their offer was much below what is usual for work of the kind; and the matter ended with an acknowledgment to the effect that the Board would not be justified in imposing charges on such a scale as that mentioned in our correspondent's letter. The £5 5s. offered for an arbitrator in this matter was lower in all probability than the witnesses charged for their services, and they were without the responsibilities of the arbitrator! In these matters there must be some discrimination as to the value of the service to be rendered, and the reward must be measured accordingly. From a Government Department, one would certainly have expected a higher and fairer appreciation of the position.

Pushing Business at Newmarket.

The energetic Manager of the Newmarket Gas Company (Mr. J. H. Troughton) never loses an opportunity of bringing before the inhabitants of the town the all-round advantages possessed by the commodity he is engaged in supplying. By an effective advertisement in the principal local paper, he demonstrates to the consumers that the lighting of their homes and business premises will cost them less if incandescent burners are used. He gives eight cogent reasons in support of his recommendation of this system; and in a separate circular he shows how easily consumers can avail themselves of it on the terms offered by the Company. On the domestic side of the question he is no less emphatic. What human being is indifferent to health and comfort? There are two problems which most housekeepers now have to face—the fiscal and the domestic. Mr. Troughton indicates how they may both be solved; and he and his Company are ready and willing, as are many others all over the country, to help in their solution. If the consumers require any further information on the subject of gas and its varied uses, they will see by their demand notes how they may obtain it at the Earl's Court Exhibition.

Our readers will regret to learn that Sir GEORGE LIVESEY is confined to his room as the result of a chill, and some little time may elapse before he will resume active duties. Meanwhile, we are pleased to know that the latest report shows Sir George is progressing satisfactorily.

THE COLSON PATENT PROCESS FOR REMOVING NAPHTHALENE FROM ILLUMINATING GAS.

THE report of the proceedings at the last meeting of the Leicester Corporation published in another part of the present issue will attract the attention of all concerned in the manufacture and distribution of gas, especially with regard to the statement therein that Mr. Alfred Colson has devised a process by the adoption of which the naphthalene difficulty in Leicester has been entirely overcome. By the courtesy of Mr. Colson, we are able to amplify the statements made in the report, and to give a detailed account of the method employed.

For several years past, Mr. Colson, like many others, has been carrying out experiments in various directions with the object of effecting a satisfactory solution of the difficult "naphthalene" problem. Among other methods, he has attempted to effect the removal of the naphthalene by washing the gas with solvents obtained from coal tar—both high boiling oils such as green oil, and low boiling ones such as solvent and other naphthas having been tried; but the results have been unsatisfactory.

Mr. Colson therefore determined to try the effect of the coal-tar oils intermediate between the high and low boiling fractions; but, as these already contain large quantities of naphthalene, it is necessary first to remove the latter more or less completely from such oils, by subjecting them to fractional distillation. It was found that this could be readily effected; and in May last the use of this oil for washing the gas was commenced at one of the Leicester works, and quickly gave most satisfactory results—all complaints of naphthalene stoppages having practically ceased from that date.

The exact method of preparing the necessary solvent will, of course, vary slightly with the nature of the tar which forms the starting-point. In the case of the tar produced at Leicester, the following procedure has been found satisfactory. The crude tar is subjected to the usual preliminary distillation; and the earlier portion of the distillate, including all that comes over before the anthracene oil, is subjected to the customary treatment for the recovery of the commercially valuable naphthas and carbolic acids. The residual creosote is then subjected to two further distillations, in which the fraction coming over below the boiling-point of naphthalene is collected. The resulting liquid, which consists mainly of oils boiling between the temperatures of 170° and 215° C., and may be described as a light creosote containing a little naphthalene, forms the new solvent, and is then ready for use without further treatment. The washing of the gas is carried out at Leicester in a Livesey washer, placed after the scrubbers; and the gas, passing in fine streams through the oil, causes it to froth very considerably—thus effecting a thorough washing. When the oil becomes saturated with naphthalene, it is run off from the washer, and replaced by fresh oil, while the spent oil may be redistilled separately or run into the tar-well.

Turning now to consider more in detail the results obtained at Leicester, it must first be pointed out that the gas is supplied from two works—the larger at Aylestone Road, and the smaller at Belgrave Gate. Very little trouble has been experienced in past years with the gas from the latter works; but in the district supplied from the Aylestone Road works, the stoppages due to naphthalene have, in former years, sometimes numbered over 500 in a single day. The washing has so far only been carried out at the Aylestone Road works; and soon after commencing to use the process, there was a complete immunity of complaints from the district supplied with that gas; while from the Belgrave Gate works, where the treatment of the gas remains unaltered, only a few naphthalene cases have been experienced. The preceding table shows in a most striking manner the difference which has been effected by the introduction of the process. In this will be found the number of complaints for each day in the months of July, August, and September, 1904, and for the corresponding days in 1903; the letter "B" indicating that the stoppage occurred in the district supplied from the Belgrave Gate works. It will be seen that, in the whole three months, not a single case of naphthalene stoppage was experienced with the gas treated.

Further, it has been found that there is no necessity to deal with the whole of the gas, in order to effect complete immunity from naphthalene trouble. In the washing process, the quantity of naphthalene in the gas is reduced at Leicester from 9 to 10 grains to about 1 grain per 100 cubic feet; and after this treatment, the gas may be mixed with a considerable proportion of untreated gas containing much naphthalene without any danger of the subsequent separation of the latter in the solid form in the mains and services. Thus at Aylestone Road, the plant is divided into two sections; and the gas in one section only is treated with the solvent oil, and then mixed with the untreated gas from the second section before going to the holders. As stated above, no solid naphthalene has been deposited from the mixed gas. The following table shows the amount of gas which has been made at each works during the past three months, and also the proportion of treated and untreated gas at the Aylestone Road works.

Number of Complaints of Naphthalene in the District.

Day of Month.	July.		August.		September.	
	This Year.	Last Year.	This Year.	Last Year.	This Year.	Last Year.
1	1 B	152	None	91	2 B	91
2	None	96	,,	1	4 B	83
3	,,	201	2 B	6	2 B	93
4	,,	144	1 B	11	None	89
5	,,	None	None	74	4 B	76
6	,,	206	1 B	66	1 B	4
7	,,	184	None	90	4 B	82
8	3 B	205	,,	116	2 B	68
9	4 B	166	1 B	None	2 B	59
10	None	172	1 B	118	2 B	40
11	,,	174	None	97	None	131
12	1 B	None	,,	149	2 B	193
13	1 B	197	,,	106	1 B	10
14	1 B	143	,,	114	6 B	208
15	1 B	204	,,	83	7 B	277
16	1 B	142	,,	None	None	220
17	None	171	,,	78	,,	184
18	,,	92	,,	116	,,	206
19	,,	None	,,	124	5 B	147
20	,,	155	,,	84	4 B	None
21	,,	87	,,	161	3 B	161
22	,,	92	1 B	119	None	121
23	,,	67	None	9	4 B	131
24	,,	101	,,	147	4 B	56
25	,,	66	,,	164	None	91
26	,,	4	1 B	165	2 B	56
27	1 B	101	2 B	123	None	None
28	None	98	None	123	3 B	64
29	,,	93	1 B	97	8 B	44
30	1 B	70	2 B	None	—	42
31	None	94	6 B	121	—	—
Total .	15 B	3677	19 B	2753	72 B	3027

Remarks.—B. Gas from the Belgrave Gate works. Not a single case is recorded from the Aylestone Road works, at which the process is in operation.

Quantity of Gas Treated for Naphthalene and Total Make, July to September, 1904.

1904. Week Ending	Aylestone Road.		Gas Treated per Cent.	Belgrave Gate.	Total Gas Made.	Total Treated.	Treated per Cent.
	Gas Treated.	Gas Untreated.		Gas Made, Untreated.			
July—	Cub. Ft.	Cub. Ft.		Cub. Ft.	Cub. Ft.	Cub. Ft.	
7	13,865,880	6,279,120	68·83	7,983,000	28,128,000	13,865,880	49·29
14	14,169,640	6,012,360	70·2	7,972,000	28,154,000	14,169,640	50·32
21	14,105,896	6,565,104	68·24	8,108,000	28,779,000	14,105,896	49·01
28	13,773,836	6,478,164	68·01	7,963,000	28,215,000	13,773,836	48·81
Aug.—							
4	13,863,024	6,133,976	69·32	7,700,000	27,697,000	13,863,024	50·05
11	12,651,740	7,019,260	64·31	7,557,000	27,228,000	12,651,740	46·46
18	12,731,236	8,512,764	59·92	8,158,000	29,402,000	12,731,236	43·30
25	12,878,152	10,571,848	54·91	8,132,000	31,582,000	12,878,152	40·77
Sept.—							
1	12,735,688	10,562,312	54·66	7,862,000	31,160,000	12,735,688	40·87
8	19,176,962	6,324,038	75·20	9,851,000	35,352,000	19,176,962	54·24
15	20,348,260	5,126,740	79·87	8,241,000	33,716,000	20,348,260	60·35
22	21,474,304	3,828,696	84·87	7,871,000	33,174,000	21,374,304	64·73

The necessary apparatus—a Livesey washer—is comparatively inexpensive; and the oil can be produced at a cheap rate. As the results so far show that a quantity of 20 gallons per million cubic feet of gas actually treated is ample, the total cost of the process only amounts to a small fraction of a penny per 1000 cubic feet.

The great services of the late Mr. H. A. Willey to Exeter were warmly recognized at a meeting of the City Council last Wednesday. A resolution which was passed referred to the unsparing manner in which he devoted his great talents to the advancement of the city, and to his generous liberality, particularly in the establishment and management of the Manual School, and expressed the opinion that by his death Exeter is distinctly the poorer. Several members of the Council bore testimony to Mr. Willey's great worth; the Mayor remarking that one of the most charming features of his life was his intense sympathy, and his utter unselfishness in every view he took of other people's action. At the suggestion of some of the speakers, the Mayor said he would take early steps with a view to the provision of some memorial to Mr. Willey in the city.

Mr. Charles Eastwood, who for upwards of twenty years held the position of Superintendent of the Linacre works of the Liverpool Gas Company, and has now retired on superannuation, has been presented by the employees at the works with a set of Russian bronzes, consisting of a centrepiece group of horses, and side ornaments, as a mark of their esteem. About 300 assembled on the occasion; Mr. John Carter presiding. The Chairman referred to Mr. Eastwood's long connection with the works, to his many kindnesses, and to the improvements he had made, which were beneficial to the workmen as well as to the Company. Mr. Morgan having presented the bronzes on behalf of the men, Mr. Eastwood, in acknowledging the gifts, compared the works twenty years ago with those of the present day, and expressed his best wishes for those who had so long worked with him.

THE EARL'S COURT EXHIBITION.

THE arrangements are being rounded off by which the Advisory Committee of the Institution of Gas Engineers are hoping to popularize the exhibition at Earl's Court. A good attendance of gas officials and those who are intimately concerned in the direction of gas undertakings is already assured; and it is the general public now whom the Committee desire to draw. The system of issuing passes for general distribution among gas consumers and householders (the companies or corporation gas committees only paying at the rate of 3s. per dozen for those actually taken up at the entrance) is one which was only adopted quite recently by the Committee; and it has met with considerable approval. The passes will not only entitle the holders to admission to the exhibition, but to the entertainments, lectures, concerts, &c., on the date of the visit. In addition to this, it is learned that gas undertakings can be supplied with tickets to sell (at the price already mentioned) at their offices to consumers who desire a quantity; the ordinary price of admission to the exhibition being a shilling.

The Committee have recognized that it requires something more than a large collection of gas plant and appliances to attract and maintain the interest of the public; and so they have arranged for a variety of popular entertainment. Three military bands have been engaged—the Coldstream Guards, the Irish Guards, and the Scots Guards; and performances will be given twice daily. There will also be a café chantant each evening in the Queen's Restaurant, open quick-cookery competitions every day for substantial prizes, as well as lectures on heating, cooking, and lighting. Among other attractions which will appeal to the public taste will be a workman's cottage and modern shop, completely fitted, and showing the use of the prepayment meter. The fact that entertainment of this kind will be provided should be largely advertised. Mentioning the question of advertising reminds us that a considerable number of designs were sent in in connection with the poster competition. The one which was awarded the first prize is now in the printer's hands, and will in due course be seen at practically all the railway stations in the Kingdom.

The Chairman of the Committee (Mr. J. W. Helps), writing in reference to the editorial remarks on the subject of the exhibition in last week's issue, informs us that the statements as to the scheme of organized visits of the District Associations are quite correct. The view of the Advisory Committee is that these visits should be purely informal, as it would be quite impossible to hold formal meetings of the Associations (as some have erroneously supposed was the intention) during the run of the exhibition. As to the question of conferences, it is understood that the Council of the Institution are giving it further consideration. The views expressed last week regarding this subject are those of several gas engineers; and we cannot help thinking that an exhibition at Earl's Court and a technical conference would not be a successful combination. There would be a considerable amount of labour involved in connection with such a conference; and, if the attendance were affected by the outer attractions, the labour of the few would be but ill rewarded. There are also other considerations. If a conference is held, it would mean that professional attendance would be, to a considerable extent, made in one large block, instead of being distributed throughout the course of the exhibition. This would not meet with the approval of the exhibitors; in fact, it would be unfair to them, in view of the heavy expense which they are incurring for the four weeks' run. The primary object of what is forthcoming at Earl's Court is the exhibition; and for the inspection of the exhibits there should be the greatest amount of liberty. Regarding the proposal for an exhibitors' club, there is no doubt that, if suggestions are made on the subject by the exhibitors, the Advisory Committee will give to them very serious attention.

Concerning the competition in the matter of new and artistic fittings, the awards, amounting in the aggregate to £100, are to be open to all without entrance fee or charge for space; but those contemplating competition, may be reminded that entries should be made before the 31st of this month. The awards are for approved novelties in pendants, brackets, short standards, made in any metal, and completely finished with lantern or shade, fit for use with any form of incandescent gas-burner. These are for domestic lighting. Drawings or scale models showing new and approved designs for 20 feet and 12 feet lamp-posts come into the second division of the competition. All the designs, it may be pointed out, will remain the property of the exhibitors. Arrangements are also now being made for the cookery competitions; and particulars will be issued almost immediately. Proposals have also been invited for the general inside and outside lighting of the exhibition. The available areas have been divided into a number of sections; and the positions, we believe, were to be determined by ballot at a meeting yesterday.

From these notes, it will be seen that the arrangements for the exhibition are being perfected at a rapid rate. The designs for the stands which have come before the Committee are of an excellent and attractive character; and already something like 95 per cent. of the available space has been let. All that the Committee want now is the countenance and support of as many companies and local authorities as possible, beyond those who have already given encouragement by contributions and in helping in the ways suggested to secure a good attendance of the public.

LIST OF EXHIBITORS.

The following is a list of the exhibitors to date, in the order in which they have been registered:—

Messrs. Parkinson and W. & B. Cowan, Ltd., meters, stoves, &c. Anti-Vibration Incandescent Lighting Co., Ltd., "A.V.I.L." gas fittings and Greenall's gas-meter. Imperial Stove Company, gas-stoves. Messrs. Graham, Morton, & Co., Ltd., conveying plant in motion. Messrs. Parkinson and W. & B. Cowan, Ltd., meters. Messrs. S. Clark and Co., hygienic gas heating, cooking, and boiling stoves. Cannon Iron Foundries, Ltd., gas-stoves. Moffat's, Ltd , gas-lamps. Messrs. Meldrum Bros., Ltd., "Meldrum" patent breeze furnace, &c. Messrs. B. Gibbons, jun., Ltd., fire-clay goods, retorts, &c. Messrs. Gibbons Bros., Ltd., elevating and conveying plant, construction of regenerating furnaces and general gas-works ironwork. Messrs T. Glover and Co., Ltd., and R. & A. Main, Ltd., gas stoves, meters, engines, &c. Messrs, Bilbie, Hobson, and Co., Stockort gas-engine. Messrs. Falk, Stadelmann, and Co., Ltd., gas-stoves, &c. Davis Gas-Stove Company, Ltd., gas-stoves. Messrs. Alder and Mackay, wet and dry gas-meters. Messrs. George Waller and Son, exhausting machinery, &c. Chemical Engineering Co., and Wilton's Patent Furnace Co., chemical fuel, furnaces, &c. Meteor Light and Heat Co., "Meteor" patent incandescent gas-burners. Messrs. Jas. Stott and Co., ventilators. The United Engineering Co., Ltd., tube machines, pipe and hose couplings, &c. The Automatic Light Controlling Company, Ltd., automatic lighting and extinguishing apparatus. Messrs. Willey and Co , Ltd., gas cookers, fires, &c., gas-meters. The New Inverted Incandescent Gas-Lamp Company, gas burners and fittings. Messrs. Geo. Bray and Co., Ltd., gas-lighting appliances. The Temperley Transporter Company, model of transporter and traveller. Messrs. Fletcher, Russell, and Co., Ltd., gas cookers, fires, &c. The West's Gas Improvement Company, Ltd., gas plant, &c. Messrs. Joseph Taylor and Co., saturators, &c. Messrs. W. C. Holmes and Co., rotary scrubber-washer, patent tar-extractor, valves, purifying-machine. The Planet Foundry Company, Ltd , gas cooking ranges and stoves. The Ferrubron Manufacturing Co., thorium nitrate and kindred chemicals. Messrs. Mobberley and Perry, fire-clay, fire-bricks, retorts, &c. The Richmond Gas Stove and Meter Company, Ltd., gas apparatus for cooking, heating, and lighting, gas-meters, and brass work of all descriptions. Messrs. W. Clark and Co., hydraulic engineers. The Rotary Gas-Meter Syndicate, Ltd., patent rotary meters. Mr. W. H. Tilley, gas-meters. The Premier Boiler Tubes, Ltd., gas apparatus and boiler flues, &c., retort-charging apparatus, &c. Messrs. Samuel Cutler and Sons, Millwall, E., gas-works plant. Messrs. E. C. Hayward and Co., "Humphrey" gas arc lamps. James Keith and Blackman Company, Ltd., ventilating and lighting. Messrs. Wilsons and Mathiesons, Ltd., gas cooking and heating stoves. Messrs. James Milne and Son, Ltd., gas apparatus, gas fixtures and fittings. The Globe Light, Ltd., gas burners and fittings. Mr. Julius Moeller, gas lamps and appliances. Messrs. Harris and Pearson, fire-clay and bricks. The Sheepbridge Coal and Iron Company, Ltd., pipe castings and pig and bar iron. Mr. H. W. Hanwell, gas pendants and fittings. The Automatic Gas-Meter Company, prepayment gas and other meters. The Tourtel Manufacturing Company, Ltd., gas meters and gas apparatus. Messrs. Kirkham, Hulett, and Chandler, Ltd., gas apparatus. Messrs. Bryan Donkin and Clench, Ltd., gas exhausters, valves, &c. The Voelker Incandescent Mantle, Ltd., mantles. Messrs. Ashmore, Benson, Pease, and Co., Ltd., gas engineers. The Gas-Meter Company, Ltd., gas meters and fittings. Messrs. Crossley Bros., Ltd., gas-engines, combined with dynamos for electric lighting. The Selas Light Company, high-pressure, lighting machines, with the necessary burners and driving power, gas-motor and water-motor, and lamps and brackets. Messrs. Bever and Wolf. Messrs. W. Sugg and Co , Ltd., lighting, heating, cooking, and ventilating. Mr. S. R. Dresser, insulating couplings and fittings. The Silica Fire Brick Company, fire-bricks and cement. Mr. Jacques Kellermann, gas self-lighter, gas-burner. Mr. George Wilson, gas meters, pressure registers, station meter, indexes, &c. The Staveley Coal and Iron Company, Ltd., castings of various descriptions, gas and water pipes. The Pharos Light Syndicate. The Westmoreland Coal Company (Philadelphia), exhibit of coal. Messrs. J. Firth Blakeley and Co. The Alexander Manufacturing Company, cocks and valves, screwing-machines and engineers' tools. The Mork Patent Pulley Block Company, pulley blocks. Messrs. Rotherham and Sons, brass taps and other small parts, "Change-giving" fixture to be used in connection with slot gas-meters. The Mica Boiler Covering Company, Ltd., covering for steam pipes and boilers. Messrs. T. S. Marriage and Co., street-lanterns. Messrs. Wilson Carter and Pearson, Ltd. Messrs. Abendroth Brothers, gas-ranges. The Dudbridge Iron Works, Ltd., gas engines. Messrs. A. E. Podmore and Co., gas lighting. The National Gas-Engine Co., Ltd., gas-engines. Messrs. Blagden, Waugh, and Co., bye-products of gas. The Ironmonger Rope and Twine Co., pipe packing of various descriptions. The United Flexible Metallic Tubing Company, Ltd. The United Chemical Works, incandescent mantles. The Wigan Coal and Iron Company, Ltd. The Settle Padfield Syndicate, gas apparatus, boiler flues, &c. The Guaranty Incandescent Mantle Company. Messrs. Townson and Mercer, apparatus for analysis of gas. Mr. C. F. Zimmer, conveyors. Messrs. G. Scott and Co., portable gas-cooking stoves. Mr. Thomas Potterton, hot-water circulating domestic supply apparatus. The Adjustable Cover and Boiler Clock Company. The Simms Manufacturing Company, Ltd., gas-stoves, &c. The Carron Company, gas-stoves. Messrs. Biggs, Wall, and Co., saturators. The Dewey Lighting Syndicate, Limited. Mr. A. E. Harris, patent gas-griller. Mr. I. Nutting, tubular boilers, gas-stoves, &c. The Air Light Company, Ltd., intensified light with apparatus. Messrs. Robert Dempster and Sons, Ltd., gas apparatus, &c. Drakes Limited, gas plant. Gaslight and Coke Company, artisan's living room and shop (fitted). Mr. F. D. Marshall. Messrs. Henry Balfour and Co., Ltd. Messrs. R. Laidlaw and Son. The Buhlmann Incandescent Syndicate, Ltd., incandescent mantles. The Briquettes Minerals Building Company, Ltd., briquettes.

GAS ACTS FOR 1904.

(*Continued from Vol. LXXXVII., p.* 870.)

FROM the batch of Gas Acts noticed last week dealing with the incorporation of Companies, there were two missing, owing to their not being available. They were the Barnard Castle and Brixham Acts.

The Barnard Castle Gas Company is incorporated with a capital of £25,000, consisting of £11,232 original capital and £13,768 additional capital. The borrowing powers are to be one-third, inclusive of £2000 borrowed on debentures by the Limited Company. On the original capital, the dividend is to be 7 per cent., and 5 per cent. on the additional capital. The District Council are not to be answerable for any damage to the mains or service-pipes by steam-rolling, or for damage not wilfully done in any other manner to the mains or pipes, unless those so damaged are laid 2 feet or more in depth from the surface of the street to the upper surface of the main or pipe. The Company are authorized to purchase by agreement an additional 3 acres of land. The maximum price of gas is to be 3s. 6d. per 1000 cubic feet in Barnard Castle and Startforth, and 4s. 6d. in other parishes within the limits of the Act. The illuminating power of the gas is to be 14 candles, tested as in the Felixstowe Act mentioned last week. Slot supplies are governed by the Chippenham clauses. Discounts not exceeding 10 and 15 per cent. for prompt and large consumption are prescribed. The Company have power to apply for an Electric Lighting Order.

In the case of the Brixham Gas Company, the capital is to be £20,000, of which £6000 is original capital and £14,000 additional. In issuing stock, preference may be given to bids or offers, if they be of the same amount as those of any other person, of existing holders of shares or stock, employees, and consumers; and shares not sold by auction or tender may also be offered to share or stock holders, employees, or consumers. Borrowing powers are granted to the extent of one-third of the issued capital. Dividend on the preference capital is limited to 6 per cent., on the original capital to 10 per cent., and on the additional capital to 7 per cent. The formation of a renewal fund is permitted, on the ordinary conditions. Auditors who are chartered accountants are provided for. By agreement, the Company may purchase further lands up to 2 acres. The standard price of gas is fixed at 4s. per 1000 cubic feet; and half-yearly penny reductions or increases carry changes of 2s. 6d. per cent. on the 10 per cent. capital, and 1s. 9d. per cent. on the 7 per cent. capital. The prescribed illuminating power is 14 candles, tested as defined in the Felixstowe Act. The Company are to mark a map to be furnished by the District Council, with the position of their distributing mains, and, once every year, at the request of Council, are to give full information of all mains laid in the preceding year.

The Act by which the Bexhill Water and Gas Company have extended their powers is divided between their two undertakings. But the greater part refers to water; and therefore we will merely, for the present, indicate such of the powers as have any connection, in whole or part, with the gas supply. The authorized capital of the concern is now extended by £120,000, which may be issued as new ordinary or preference shares or stock, and carry dividends of equal amount to the existing similar classes of shares or stock. Inclusive of £20,000 already borrowed, the Company may borrow to the extent of one-third of the total issued capital. The area of supply has been enlarged so as to include Ninfield, Hooe, Catsfield, Worthing, Ashburnham, and Hurstmonceux. The gas provisions of the Act are all of a usual character, excepting (under the new order of things) the prepayment meter clauses, which allow the Company to charge 1s. per 1000 cubic feet extra for "hire of meter and the fittings used therewith;" while the maximum charge for the hire of a prepayment meter without fittings is to be at the rate of 10 per cent. on the cost of the meter.

To meet the growing demand for gas in their district, the Blyth and Cowpen Gas Company are authorized by their new Act to erect further works, and to purchase by agreement an additional 10 acres of land. The existing share capital of the Company is to be consolidated and converted into an equivalent amount of ordinary 5 per cent. stock; and authority is given to raise an additional £100,000 of ordinary stock. On the existing capital of £37,500, the Company are allowed to borrow £13,000, and to the extent of one-third on the issued additional capital. A renewal fund to the amount of 10 per cent. on the paid-up capital may be accumulated by the appropriation out of revenue of 1 per cent. per annum on the paid-up capital. Of course, the standard rate of dividend will henceforth be 5 per cent.; and the provisions in the Company's 1887 Act as to the sliding-scale are to be altered to meet the changed conditions brought about by the conversion of the capital. The sliding-scale is to operate in any half year, instead of year; and, in consequence, the words "five shillings" in the old provisions are to be displaced by "one shilling and threepence"—this being the amount of the half-yearly variation in dividend for penny changes in the price of gas. The Company are granted the right to allow a discount of 10 per cent. to consumers in consideration of the payment of gas-rents "upon such days as the Directors may fix," and not exceeding 15 per cent. in respect of large consumption. During the progress of the Company's Bill in Parliament in 1887, the illuminating power was increased from 14 to 15 candles. There has been a readjustment in the past session; and 14-candle gas is now to be permitted. The testing-burner is to be the "Wandsworth," with a 6-inch by 1⅝-inch chimney; while the standard is to be Harcourt's 10-candle pentane lamp, with table photometer.

The Colney Hatch Company will henceforth be known as the Southgate and District Gas Company, which is certainly a more appropriate title. The change has been effected by the Act which the Company secured during the past session, and in which also is a confirmation of a plan agreed upon with the Tottenham and Edmonton Gas Company, defining with greater accuracy the boundary of their respective limits of supply. Power is conferred upon the Southgate Company to compulsorily purchase certain lands, and to acquire by agreement an additional 10 acres, but not more than 3 acres in the urban district of Southgate without the consent of the District Council. Authority is granted to stop up a public highway, as the Company become the owners in possession of the houses and lands on both sides of it. Additional capital to the amount of £100,000 is authorized, bearing upon such part as is raised as ordinary capital a 7 per cent. dividend, and upon such part as is raised as preference capital a 5 per cent. dividend. The Company may borrow to the equivalent of one-third of the paid-up additional capital. The price of gas is not to exceed 4s. 6d. per 1000 cubic feet. The Company have also obtained the right to a renewal fund, to be formed by appropriating each half year out of revenue an amount not exceeding ½ per cent. on the paid-up capital. A map is to be kept of the mains in Southgate and Finchley, is to be corrected at least once a year, and is to be accessible at reasonable times by the District Councils. The illuminating power is to be 14 candles, tested by the "Wandsworth" burner, with a "suitable" chimney. The standard used is to be Harcourt's 10-candle pentane lamp, with table photometer. The apparatus and mode of making the test may, if the Company or the two District Councils previously named desire, be such as is from time to time prescribed by the Gas Referees for testing gas of an illuminating power of 14 candles in the Metropolis. A testing-place is to be provided by the Southgate Council at their Fire Station, and the Company are to provide the necessary apparatus. The Directors are empowered to fix the remuneration of the Secretary. It is also definitely laid down that the Auditors shall be members of either the Institute of Chartered Accountants or of the Incorporated Society of Accountants and Auditors; but this section is not to operate "so long as the existing Auditors are elected or re-elected." A discount not exceeding 15 per cent. is permitted for large consumption.

The Croydon Gas Company is the shortened title which the Croydon Commercial Gas and Coke Company have obtained authority to use. Their Act, in other respects, is essentially a financial one. Power is given to raise additional capital not exceeding £300,000, and to be known as "D" stock. The holders of this stock are to be entitled to a fixed maximum dividend of 5 per cent. per annum; but if, in any half year, the dividend on the "B" stock is at a less rate than 5 per cent. the "D" stock is, for the purposes of dividend, to rank *pari passu* with the "B." Provision is made for offering the stock to consumers or persons in the employ of the Company, before submitting it to auction or tender. The Company have already borrowed £37,500 in respect of their existing "A," "B," and "C" stocks; and, including this sum, they may immediately borrow to the extent of one-third on those stocks, and afterwards to the amount of one-third of the issued additional capital. No higher rate of interest than 5 per cent. is to be allowed on borrowed money. The sliding-scale as to dividend on the existing capital is now made dependent on the price of gas in any half year, instead of year. A renewal fund is allowed on terms already several times mentioned. The Company have power to purchase by agreement an additional 25 acres of land. The differential price charged for gas in Carshalton is reduced to a threepenny excess of the price in Croydon; and after July 1, 1907, the price will be made uniform.

The Gomersal Gas Company's Act is also one for improving their financial position. The existing capital is consolidated on a 5 per cent. basis; and additional capital is authorized to the extent of £20,000. The Company may borrow one-third of the nominal amount of the consolidated ordinary stock, and to a like degree in respect of the additional capital. A renewal fund is allowed. The standard price charged for gas is to be 4s. 6d. per 1000 cubic feet; and penny changes in price in any half year will carry 1s. 3d. variations in dividend. By agreement, the Company may purchase a further 3 acres of land. Discounts up to 10 and 15 per cent. for prompt payment and for large consumption respectively may be allowed.

By the Ryde Gas Act, the Company secure an extension of limits, so as to include parts of the parishes of Binstead and Ashey not already embraced by them. They are also authorized to convert the original and ordinary shares into a 5 per cent. stock, and to raise additional capital to the amount of £50,000. The Company have already borrowed, in pursuance of their Act of 1866, £12,500; and they are to be allowed to raise this to an amount equalling one-third of the ordinary consolidated stock. The additional capital also carries the right to borrow up to one-third of the sum paid up. In this case again, it is enacted that the Auditors shall be members of the Institute of Chartered Accountants or of the Incorporated Society of Accountants and

Auditors. A renewal fund is granted; and for the first time the Company are changing over from the system of maximum price to a standard price and sliding-scale. Within a radius of 1¼ miles from the Town Hall Clock Tower, the standard price of gas is to be 3s. 6d., and in the remainder of the limits 4s. per 1000 cubic feet; and 1s. 3d. increases or decreases of dividend accompany penny reductions of or additions to the price of gas in any half year. The lands now held by the Company may be supplemented by 5 acres.

The Sheppy Gas Act also consolidates and converts the existing ordinary capital of the Company into £63,000 of 5 per cent. stock; and additional capital is authorized amounting to £30,000. The Company have exercised their borrowing powers to the extent of £4000; and they may now borrow up to the amount of one-third of, and at an interest not exceeding 5 per cent. on, the fully paid-up stock. The Directors (as in other cases this session) have taken the power to themselves determine the remuneration of the Secretary.

The Act of the South Shields Gas Company is a heavy one; and some extensive work is comprised in the powers. In Jarrow, a retaining wall and embankment on the south shore of the River Tyne of considerable length is authorized, together with a jetty or landing-stage; and in South Shields, a railway siding some 9 or 10 chains in length connecting up the South Shields Branch Railway of the North-Eastern Railway Company with the Shields works, and terminating near the coal-stores. The works in the Tyne are, of course, subject to the approval of the Board of Trade and the Tyne Commissioners. Numerous clauses are inserted for the protection of the Harton Coal Company, a small part of whose lands the Gas Company are taking; and others for the protection of the North-Eastern Railway Company and the Sunderland and South Shields Water Company. If the railway siding is not completed within five years, the authorization will cease. Powers for the compulsory purchase of certain lands are given; and by agreement the Company are allowed to acquire a further 5 acres. The Company are authorized to raise additional capital to the amount of £150,000 by the creation of preference and ordinary stock. Any stock not sold by auction or tender may be offered, at the same reserve price, to the holders of stock in the Company or to the employees and consumers. Including £57,522 already borrowed, the Company may borrow up to one-third of the existing capital, and of the additional capital as issued and paid up. The standard rate of dividend is 5 per cent.; a penny reduction or increase in the price of gas carrying, in a half year, a variation of 1s. 3d. per cent. up or down in the dividend. The standard price of 3s. 3d. fixed by the Act of 1879 has been lowered by 3d. In the rural district of South Shields, an excess of 4d. upon the price within South Shields, Jarrow, and Hebburn is allowed. The Chippenham prepayment meter clauses (referred to last week) are applied. The Company may grant discounts upon the scale prescribed by their Act of 1879, but not exceeding in any case 20 per cent., to consumers of gas in consideration of the payment of gas-rents upon the days fixed by the Directors. The standard illuminating power of the gas is reduced to 14 candles; and it is to be tested "with the same apparatus and by the same method as may for the time being be prescribed for testing the illuminating power of gas supplied in the Metropolis for which the prescribed number of candles is 14." Provision is made for the supply to consumers, if required, of suitable burners for the lower quality of gas to be sent out. An agreed adjustment of boundaries with the Newcastle and Gateshead Gas Company is ratified.

The Act which represents the remnants of the Bill promoted by the Crystal Palace District Gas Company is endorsed with the new choice of name—"The South Suburban Gas Company." The Company's standard price is 3s. 2d. per 1000 cubic feet; and the Act makes the sliding-scale apply to half-yearly changes in price. Provision is also introduced for first offering stock to consumers and employees. The Act includes the scheme for the representation of employees in the management of the Company, at any time that the Directors think expedient after the total investments of the employees in the ordinary stock exceed the nominal amount of £10,000. This part of the Act has been explained at recent meetings of the Company. Power is also conferred on employees holding stock to nominate persons to whom stock is to be transferred in the event of death.

The Southend-on-Sea Gas Company obtain power to take certain scheduled lands, provided that the Company shall not acquire any lands over which the Corporation have a right of way without their consent. They may also purchase by agreement further land to the extent of 10 acres. Additional capital is authorized to the amount of £200,000. In the application of the provision of the Act of 1898 as to the dividend being dependent on the price charged for gas, 4s. is substituted for 4s. 3d. The Company may borrow up to one-third on the additional capital issued and paid up. The qualification of a Director is altered to the possession in his own right of £1000 nominal value of ordinary stock. The Directors are empowered to henceforth determine the salary of the Secretary; and it is further enacted that one of two Auditors must after Jan. 1, 1907, be a Chartered Accountant. A renewal fund is also authorized. Regarding the prepayment system, the excess charge for meter and fittings is only 8d. per 1000 cubic feet, and 1s. if a cooker is included; while 4d. per 1000 cubic feet is the excess for a meter alone. Discounts are limited to 10 per cent.

For the purposes of their undertaking, the Sutton Gas Company are permitted, by their new Act, to purchase by agreement an additional 5 acres of land, to convert and consolidate all their original and additional capital into stock on a 5 per cent. basis, and to raise further capital to the amount of £60,000, which may be first of all offered to the consumers and employees. Borrowings may be made to the extent of one-third on the paid-up additional capital. A renewal fund is allowed—but only to the total of one-twentieth of the paid-up capital for the time being—by the appropriation in each half year of ½ per cent. on the paid-up capital. The maximum price of gas is substituted by a standard price of 3s. 2d. per 1000 cubic feet, and within the parish of Banstead and Worcester Park of 3s. 8d. The sliding-scale is made to operate on changes in price in any half year; 1d. carrying variations of 1s. 3d. per cent. in the dividend. For the hire of prepayment meters and fittings, 10d. excess is authorized, "provided always that the Company shall be entitled to charge 1d. for any less quantity than 100 cubic feet." Ten per cent. on the cost is permitted for a prepayment meter, without fittings. For prompt payment of accounts and for large consumption, 10 and 15 per cent. respectively are to be the maximum discounts.

The Act of the Tynemouth Gas Company empowers them to raise £150,000 of additional capital, with one-third borrowing powers. Further authority as to land purchase by agreement is conferred—to the extent of 16 acres. After Sept. 30, the maximum price of gas in Tynemouth and the urban district of Whitley and Monkseaton is to be 3s. per 1000 cubic feet; and, from June 30 last, the price charged in Whitley and Monkseaton is to be the same as in Tynemouth. The standard illuminating power of the gas is reduced from 16 to 14 candles; and the tests are to conform with those prescribed for making tests of 14-candle power gas in the Metropolis. This is the Act in which it is decreed, in delightfully equivocal (when unpunctuated) terms, "no change shall be made in the composition of the gas and no enrichment of the gas shall take place after the gas leaves the gasholder." The Company are within the next twelve months to exchange the burners of prepayment consumers for burners suitable for the consumption of the 14-candle gas, and, within two years, when required to do so by ordinary consumers. An amendment of the Company's Act of 1897 provides that they shall not be required to provide free of charge any main or service pipe or stop-cock for the lighting of any public lamp situate at a greater distance than 75 yards from an existing main or service-pipe.

The Whitby Gas Company have secured power to raise £25,000 of additional capital, which, after it has been offered for sale by auction or tender and not sold, may be offered to existing holders of stock or shares or to the consumers or employees of the Company. Borrowing powers to the extent of one-third are granted. A renewal fund equal to 10 per cent. on the paid-up capital is allowed to be built up by annual appropriations not exceeding 1 per cent. The standard price is to be 4s. 6d. per 1000 cubic feet; and variations of 1d. in price will carry changes in dividend of 5s. per cent. on the 10 per cent. capital and 3s. 6d. on the 7 per cent. capital. An excess of 10d. on the ordinary price is authorized for prepayment meters and fittings, and 10 per cent. on the cost of the prepayment meter where no fittings are supplied. By agreement, the Company may purchase an additional 3 acres of land. Discounts up to 10 per cent. for prompt payment and 15 per cent. for large consumption may be allowed. A purchase clause in favour of the District Council has been inserted, to be exercised in "the next or then following session of Parliament."

Slot-Meters and the Supply of Coppers.—It is said that Liverpool is just now suffering, like other places, from a dearth of coppers; but this is not attributed to the amount absorbed by the tramways. As a matter of fact, only 25 per cent. of the average weekly takings of the tramways, or about £2800, is paid in coppers. The shortage is really said to be due to the popularity of penny-in-the-slot gas-meters. Of these, there are no fewer than 35,000 in Liverpool; and as they are only cleared once a quarter, it may be imagined that they tie up a very considerable amount of copper.

The Retort-House Travelling Platform.—Since the Scott and Dempster patent travelling platform was illustrated and described in the "JOURNAL" for Aug. 23 last, Mr. Scott has devised an arrangement forming a guard to the open subway. This consists of a chain or wire rope running over pulleys to form a continuous protection. The wire-rope or chain is arranged with fixed ends to the gable walls of the house (if convenient) or with cast-iron stands at each end of the subway to run along the front of the bench at a suitable height near the edge of the subway. Fixed to the travelling platform are two suitable stands carrying guide-pulleys at the top for diverting the chain or rope from the horizontal into a downward direction, and then two further pulleys are fixed to the under side of the platform carrying the chain underneath. This leaves the front of the platform clear for charging the retorts in whatever position it may be, and the remainder of the subway guarded. The ends of the rope need not be permanently fixed, if arrangements are made for counterbalancing. The East Dereham District Council have placed with Messrs. Robert Dempster and Sons, Limited, an order for one of these travelling platforms over the subway in front of their retort-bench.

THE PROVAN WORKS OF THE GLASGOW CORPORATION GAS DEPARTMENT.

FOURTH ARTICLE.

FIG. 37.—THE MAIN AVENUE.

WE have now reached that point in the description of the Provan works when we have to treat of portions of the auxiliary plant, and repair omissions that may have occurred through the method of treatment adopted. For this purpose, we cannot do better than betake ourselves once more to the main entrance gates, where we have before us the broad avenue leading into the works. On the right there are the offices and workshops, ending in a house capable of accommodating some dozen of the busy little locomotives that are seen darting here and there about the works with the bogies and waggons containing material. On the left of the avenue, there are several houses—the governor-house, the meter and exhauster houses, and at the end a boiler-house, with space intervening for future extensions. The meter and exhauster houses have already been described; the other buildings still need treatment.

THE GOVERNOR-HOUSE—A PARSON'S STEAM-TURBO GAS-COMPRESSOR.

Because it contains a feature of great technical interest, we will first of all turn into the governor-house. This is a building 63 ft. long by 28 ft. wide by 20 ft. high, and similar in design to the exhauster-house (described in the second article). In this governor-house is found one of Parson's latest compound non-condensing steam-turbines of the parallel flow type, coupled direct to a turbo air-compressor. The combined plant was made by Messrs. C. A. Parsons and Co., of Heaton Works, Newcastle-on-Tyne. There is something new and interesting here; and therefore it must be dwelt upon. In saying "new," we mean in the application of the Parson's steam-turbine to this particular purpose. From Provan, gas has to be sent to the holders at the Dalmarnock station, which is situated at a considerably lower level. It was therefore necessary to put down plant to force the gas along some 3 miles of mains, of 36 inches diameter, to the Dalmarnock holders. The plant just referred to was adopted for this purpose. It is capable of delivering 13,000 cubic feet of gas a minute (or 780,000 cubic feet per hour), against a total difference of pressure between the compressor inlet and outlet of 24 inches water-gauge. The steam pressure available at the stop-valve is 100 lbs. per square inch; and the engine has a free exhaust to the atmosphere. It will be remarked that this machine is equal to six of the fine exhausters on the works, which are capable of each dealing with 120,000 cubic feet of gas an hour.

The steam turbine is constructed on exactly similar lines to those used by Messrs. Parsons and Co. for driving dynamos and alternators. It consists of a cylindrical case, with rings of inwardly projecting blades, within which revolves a concentric shaft, with outwardly projecting blades. The rings of blades on the case nearly touch the shaft; and the rings of blades on the shaft lie between those on the case, and nearly touch the case. The entering steam passes first through a ring of fixed guide-blades, and is projected in a rotational direction upon the succeeding ring of moving blades, imparting to them a rotational force. It is then thrown back upon the succeeding ring of guide-blades; and the reaction increases the rotational force. The same process takes place at each of the successive rings of guide and moving blades. The energy to give the steam its high rotational velocity at each successive ring is applied by the drop in pressure, and the steam expands gradually by small increments. At the end of the spindle are grooved pistons or dummies, which fit into corresponding grooves in the cylinder. The object of the dummies is to prevent end-thrust; and there is, therefore, a passage in the cylinder between each diameter of the spindle and dummy, of the same size. The dummies also act as a practically steam-tight joint, since the clearance between the grooves can be adjusted longitudinally by a thrust-block in the end oil-keep. The bearings are of the tubular pattern; and owing to the light weight of the revolving spindle, the wear—this is the evidence of experience—is so small that the bearings often run for several years without being touched. A centrifugal governor is provided to regulate the speed of the machine; and forced lubrication is supplied to all bearings by a small oil-pump driven by worm gearing from the turbine shaft. As to the compressor portion of the plant, this consists of a cast-iron case, in which is arranged a set of three cast manganese bronze propellers and guides, about 16 inches diameter—all mounted on the same shaft—the guides being secured to the case. This shaft is coupled direct to the turbine shaft by means of a small flexible coupling. The three fans are all machined correctly to pitch, and very carefully balanced on knife edges, so as to ensure perfect running, and entire absence of vibration. The speed of the machine, when doing full duty, is about 7500 revolutions a minute. In consequence of this high speed, the space occupied by the machine is very small; the overall length being merely 14 feet, and the width 4 ft. 6 in. The total weight is only 4½ tons.

There is one thing that will strongly appeal to the engineer; and this is the smooth working of the turbine, which, in fact, is so smooth that no foundation-bolts are necessary to hold the machine in position. The foundations, too, need be only of the lightest nature. At Provan, the machine stands on a steel and concrete floor, under which all the gas mains and valves are arranged. In order that no undue stresses or strains shall be thrown on the compressor by the large 36-inch gas-mains, a flexible connection is arranged at the inlet and outlet to the machine, and a copper expansion pipe is fitted on to the steam and exhaust.

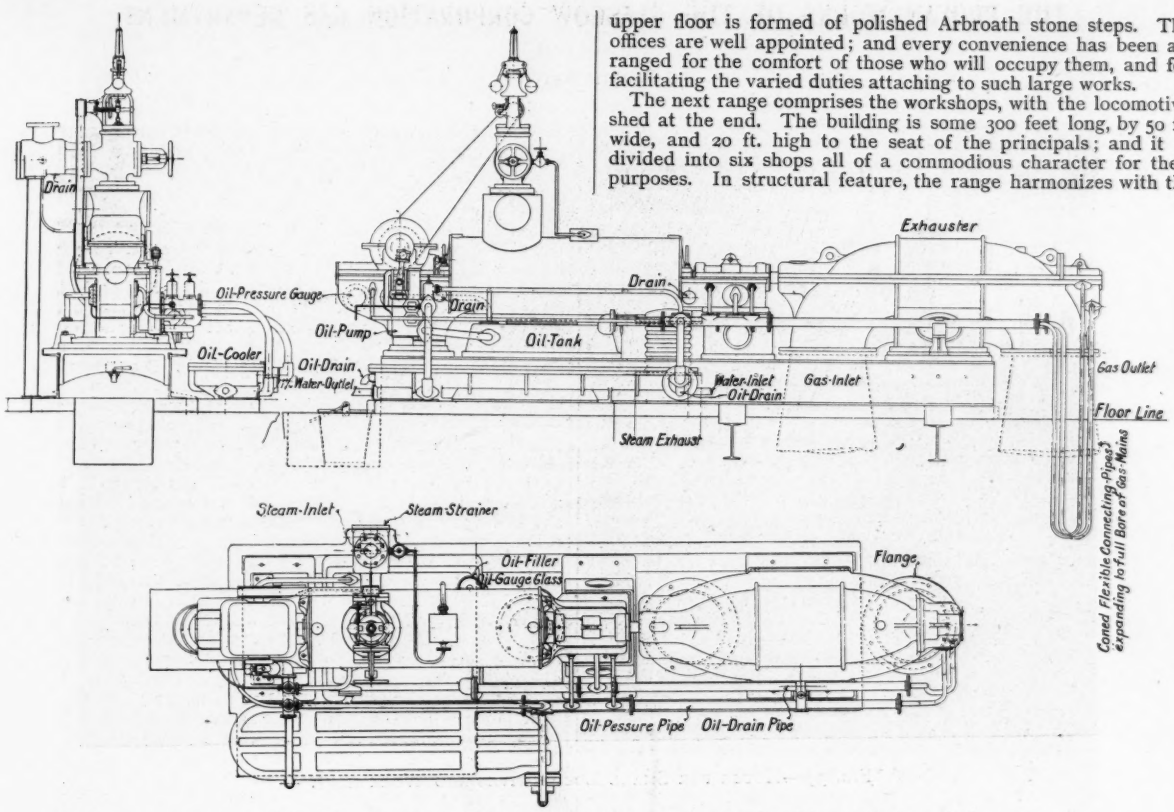


FIG. 38.—GENERAL ARRANGEMENT OF THE TURBO GAS-EXHAUSTER.

The machine at the time of our visit had not been tried under working conditions. We learn, however, that the guaranteed steam consumption at normal load is 4370 lbs. per hour; and, at the official trials at the makers' works at Newcastle, the machine was found to deliver 13,500 cubic feet of air per minute against a pressure of 52 inches water-gauge—the total steam consumption being only 5660 lbs. per hour. Therefore, when under working conditions, the consumption should be well within the guarantee. After what we have said, it is clear that the items of maintenance and attendance in connection with a machine of this character must be quite infinitesimal. Mr. Alexander Wilson, his Chief Assistant (Mr. Lowe), and the Station Manager at Provan (Mr. John Webster) are all, it is evident, looking forward to good work from this plant and some interesting experience.

With regard to the governors, Foulis governors, to regulate the pressure, have been placed on two 3-feet diameter mains as they leave the works. The air-bells for actuating these are situated in the governor-house, and are connected to them by 1-inch diameter pipes. One of these pipes is about 1400 feet long; while the length of the other does not exceed 100 feet. The pressure on the outlet-mains may be altered by adding or taking weights from the bell.

THE BOILER-HOUSE.

It will be convenient now to deal with the main boiler-house. This is a building some 55 ft. 6 in. wide by 40 ft. long, and 22 ft. high from the floor-level to the seat of the roof principals. The walls are 18 inches thick, and pannelled; the front wall being carried on two 53-feet steel joists, and two cast-iron columns, 15 feet long. The chimney, which is built at the back wall of the house, is circular, 12 ft. outside diameter at the base, and tapering to 8 ft. 3 in. diameter at the top—the height from the floor-level to the top of the cope being 90 feet. The chimney is lined with firebrick, $4\frac{1}{2}$ inches thick and 6 feet diameter inside, for a height of 40 feet. The house is fitted with two Babcock and Wilcox water-tube boilers, and one Stirling water-tube boiler, each being capable of evaporating 8000 lbs. of water per hour. The Babcock boilers are fitted with Meldrum furnaces; and the feed-pumps are by Messrs. J. & H. Carruthers. All the main and steam pipes on the works are of welded steel, with forged flanges, and were supplied by Stewarts and Lloyds, Limited.

OFFICES AND WORKSHOPS.

A glance may next be taken through the ranges of buildings on the right-hand side of the main avenue. There are first the offices, consisting of a two-storied building 60 ft. 8 in. long by 39 ft. wide, and 29 ft. high to the top of the parapet; and two single-storied buildings—one the pay and timekeeper's office (29 ft. 9 in. long by 25 ft. wide), and the other the weigh office, 24 ft. 5 in. long by 20 ft. wide. The buildings are solidly constructed; and relief is given by polished stone facings, arched doorways and windows, and in other ways. The stairway to the upper floor is formed of polished Arbroath stone steps. The offices are well appointed; and every convenience has been arranged for the comfort of those who will occupy them, and for facilitating the varied duties attaching to such large works.

The next range comprises the workshops, with the locomotive shed at the end. The building is some 300 feet long, by 50 ft. wide, and 20 ft. high to the seat of the principals; and it is divided into six shops all of a commodious character for their purposes. In structural feature, the range harmonizes with the adjoining offices. At the end near the offices, there is a fine set of rooms devoted to the use of the men. There is a bath-room (tiled) containing 10 spray baths, 16 wash hand basins, besides other conveniences. An iron stairway outside the building leads to a suite of spacious rooms overhead. There is a reading and recreation room, kitchen, and men's mess room, well fitted with every requisite for the objects to which the rooms are set apart. Provan is far away from facilities for obtaining cheap meals; and the Corporation Gas Committee have done well in providing on the works the necessary accommodation for the men. The system of working the "commissariat" department is a simple one. The Corporation find the gas-cooking stoves and all other necessities, and supply the gas free. The woman who has the privilege of being in charge buys the food, cooks it, and then sells it to the men at moderate rates, which she herself fixes. It is exceedingly gratifying to see the consideration that has been given to the men. Consideration of this kind is the foundation of contentment; and where there is contentment, there is the good workman to be found.

Descending to the pathway once more, we pass the various shops, just looking into the smithy and engineers' quarters, in which it is seen that the arrangements for fitting up with machinery and tools are comprehensive. In the engineers' shop, the power is to be derived from a Stockport gas-engine. The locomotive-shed at the end of the range is also entered; and some of the small locomotives are seen "at home." Half-a-dozen of them are already on the works; but it is manifest that, as the work at Provan develops, so will the number of locomotives.

THE PUMP-HOUSE.

Before going to the chemical works, the pump-house should receive notice. It was found necessary to put down a pumping-station to fill a store-tank at a sufficient altitude to give a supply by gravitation throughout the works. The house is furnished with two gas-engine driven centrifugal pumps, capable of lifting against a head of 120 feet. The gas-engines are capable of developing 50-horse power; and the pumps of raising 37,500 gallons of water per hour. The engines were made by the Acme Gas-Engine Company, of Glasgow.

THE CHEMICAL WORKS.

At the north-eastern extremity of the Provan site, are found the chemical works, which have been constructed by the Corporation, and which cover an area of about $7\frac{3}{4}$ acres. On the way there, a small pump-house is pointed out, which contains a gas-engine and centrifugal pump, which plant supplies water for coke-quenching and condensing purposes. The source of supply is the historic Molindenar Burn, from which the Corporation have the privilege (which would at one time have been considered almost sacrilege) of taking water through a 6-inch pipe. Now that we are on the chemical works, in conjunction with which the Corporation have very recently entered into a contract with

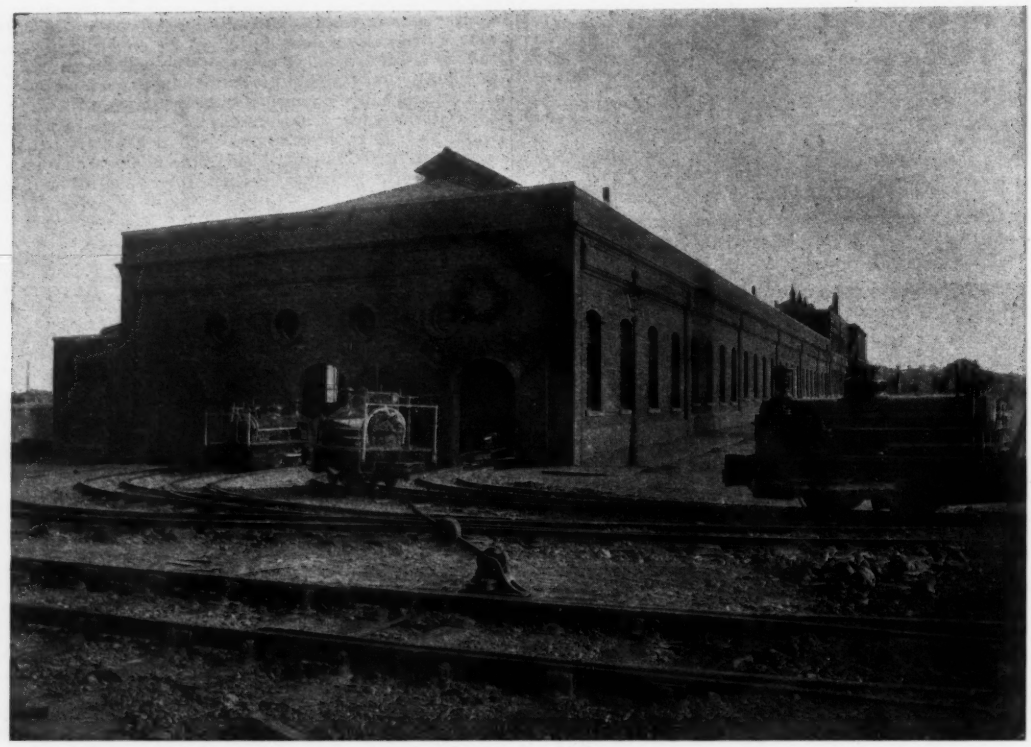


FIG. 39.—HOUSE FOR SMALL LOCOMOTIVES AND WORKSHOPS.

Messrs. Brotherton and Co., Limited, of Leeds, for the liquor and tar produced by the first section of the Provan works, the first thing that strikes one is the completeness of these works. Every part of the plant is complete within itself; and the parts compose a chemical works self-contained even to offices and workshops, and of which any great gas undertaking would be proud. The buildings and plant are so placed that considerable extensions are provided for.

We have not at disposal the information for a detailed description of these works; but there is sufficient to give readers a general idea of their character. The tar and liquor from the gas-works gravitate to an underground storage tank at the chemical works. This tank is 100 ft. long by 35 ft. broad, and 17 ft. deep, and is built of brick. Being constructed in the boulder clay, it did not require puddling over. From this tank, the tar and liquor are pumped through separate pipes, 9 inches in diameter, to two overhead storage tanks (composed of mild steel), of 500,000 gallons capacity. The pumps are of Messrs. Joseph Evans and Sons' "Reliable" type. The tanks are each provided with a steam-heating coil for causing the liquor in suspension to separate from the tar. A small underground tank is also provided for the separation of the tar from the liquor; and a "Special" Tangye

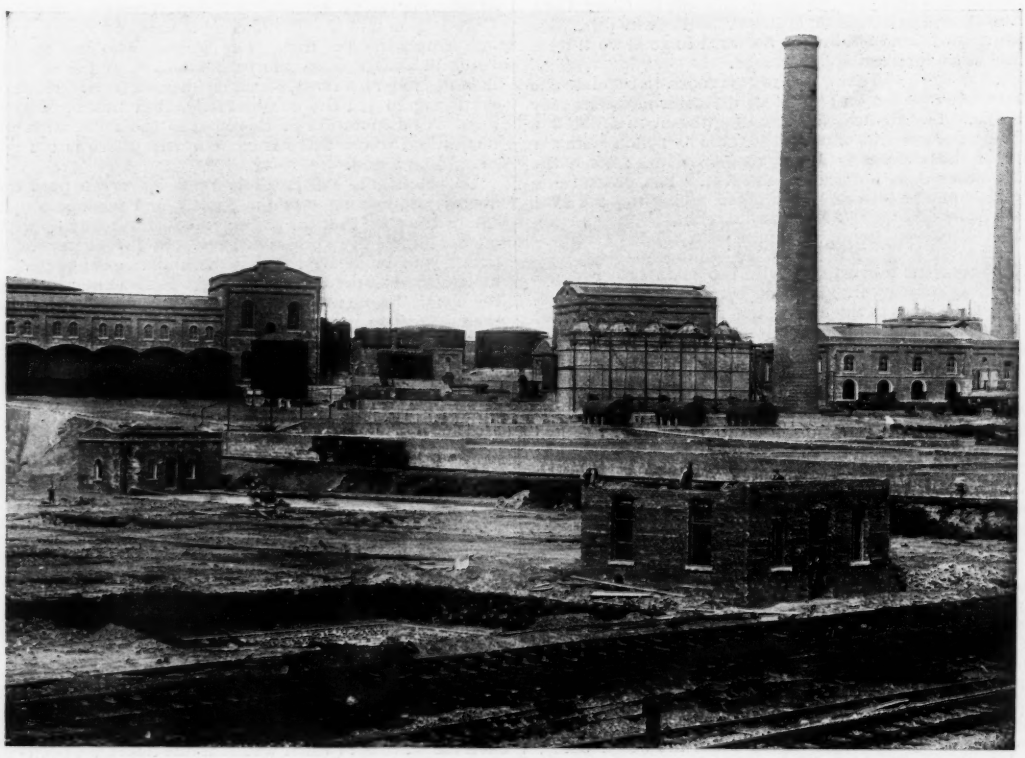


FIG. 40.—RESIDUAL PRODUCTS WORKS DURING CONSTRUCTION, FROM THE SOUTH-EAST.

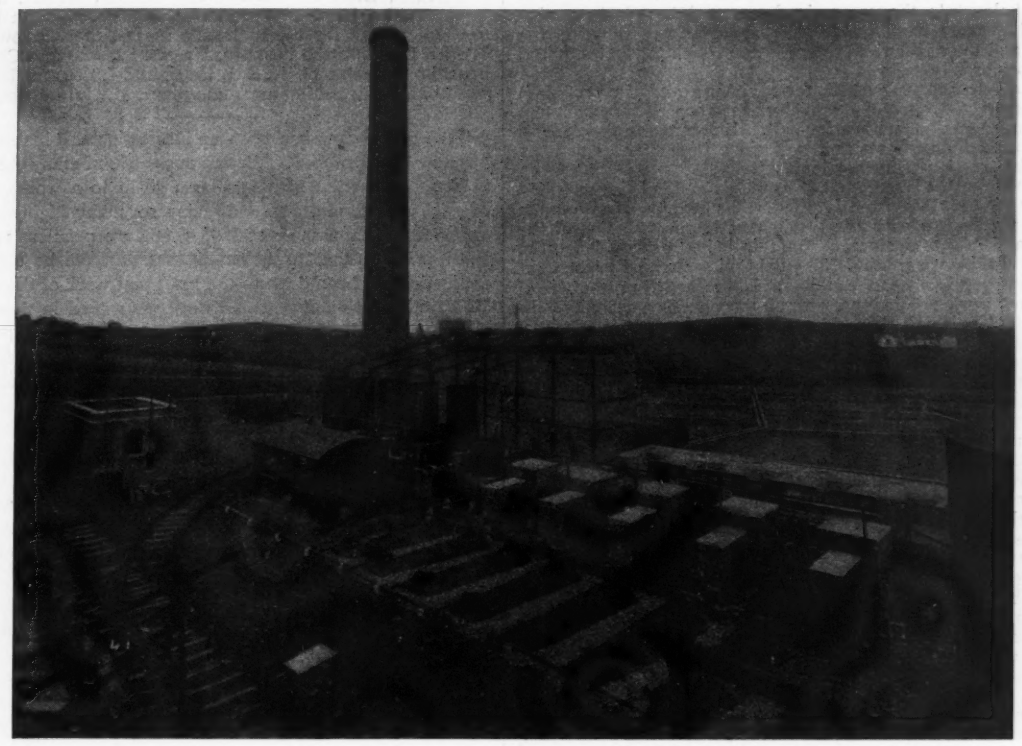


FIG. 41.—PITCH STILLS AND TANKS FOR DISTILLATES.

pump has been put in for returning the tar and liquor to the overhead storage tanks. Provision has been made for twenty tar-stills, each 23 ft. 6 in. long by 9 ft. diameter. Five of these have at present been built, and the foundations for five others are in. All the stills are provided with safety-valves. The pipes leading to the condensers are about 40 feet long, and are lagged with non-conducting material. One of the photographic views which we give shows the tar stills and condensers, receivers, and the pitch ponds in the distance.

The distillates, after being condensed, flow into underground reservoirs, from which they are pumped to the oil-storage tanks, or to the benzol and light oil and carbolic acid plants. The pitch is emptied from the stills into one of three pitch-cooling tanks, in which it is allowed to cool until its temperature is sufficiently reduced to enable it to be run into the extensive open-air pitch ponds, which are surrounded by railway sidings. An aspirator and condenser for the removal and condensation of the noxious gases from the pitch-cooling tanks is provided, as well as oxide of iron purifiers for dealing with the sulphuretted hydrogen which comes over with the oil from the condensers. The pipes for

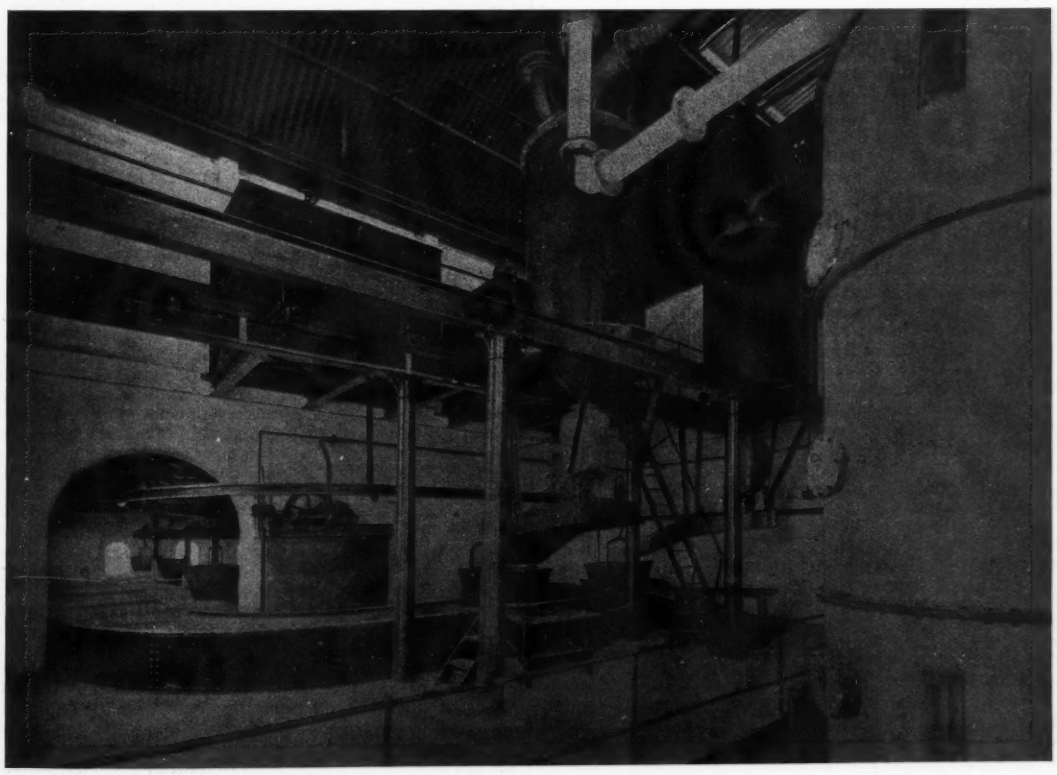


FIG. 42.—VIEW INSIDE SULPHATE-HOUSE.

conveying the middle oil (which contains a considerable quantity of naphthalene) to the reservoirs have an internal steam-pipe threaded through them to prevent solidification. Between the tar-stills and the condensers is a siding on which the fuel required for the former is brought.

Three oil-storage tanks (both for oil before and after refining) have been erected, each of a capacity of 100,000 gallons, and each having an internal steam heating-coil. Reference to the ground plan published on the 13th ult. will show that space has been left for the erection of further tanks.

The benzol plant is in course of erection, and is being supplied by Messrs. R. & J. Dempster, Limited. The plant will be of ample capacity for dealing with the produce of the first section of the works; and plentiful storage room is being provided for the benzol and solvent naphtha. The light oil is pumped to the light oil cooling-pans in another building. There are at present six of these pans, arranged in one row, of 1500 gallons capacity. In these pans (for which there is room altogether for twenty-four) the naphthalene is crystallized out. The naphthalene-store contains a centrifugal machine for drying purposes. An agitating and neutralizing-box have also been put down for the manufacture of carbolic acid.

Each plant for the different processes has its own distinct building; but the largest house of all is that in which the manufacture of sulphate of ammonia is carried on. Here we find two of Messrs. Ernest Scott and Co.'s patent ammonia stills, with saturators, &c. There is room in the house for a third set; and as the works extend, space is marked out for a further three sets. Each unit of the plant installed is capable of manufacturing 9 tons of sulphate of ammonia per twenty-four hours. The general arrangement of the plant (which is about the only part of the works that was not designed at the Corporation gas offices) is seen by fig. 42. The plant is of the vacuum type and comprises vacuum and spent liquor pumps. The saturator is of copper; and the sulphate is discharged on to a tray through an acid metal discharge-box beneath the saturator. The plant has not been in operation yet at Provan; but one of the advantages claimed over the usual type of plant is the reduced fuel consumption, which is made possible by working under a partial vacuum. From the trays, the sulphate is loaded into bogies suspended from an overhead rail. After being sufficiently drained, these bogies are pushed round the rail, and away into the sulphate-store, where they are discharged. The store is divided into five bins, and has a total capacity of 800 tons. Platforms are carried overhead for the men operating the bogies; and the sulphate can be stored up to the level of these platforms. The front wall of the store is provided with sliding doors, through which the sulphate is taken on to a loading-bank to a railway siding for facilitating the dispatch of the sulphate by rail. Both the loading-bank and the siding are roofed in.

The boiler-house for the chemical works contains four boilers; and space is left for an additional two. The boilers are of the Babcock and Wilcox type, fitted with Meldrum furnaces and with Carruthers pumps. The evaporative power of the boilers is each 5000 lbs. of water.

The Contractors.

In the course of the articles, the names of some of the Contractors have been mentioned; but we should like to place on record the names of all who were associated with the larger portions of the constructional work and plant. Any who may be omitted from the following list will no doubt find their names mentioned elsewhere. The Contractors for the ironwork of the bridges were the Brandon Bridge Building Company, Ltd.; for the excavation, brick, &c., work, buildings, tanks, &c., Messrs. R. M'Alpine and Sons; for the iron and steel work of the retort-house, &c., Sir Wm. Arrol and Co., Ltd.; for the iron and steel work of the purifiers, &c., the Brandon Bridge Building Company, Ltd.; for the iron and steel work of the gasholders, the Barrowfield Iron-Works, Limited; for the slating work, Messrs. P. White and Co.; for the plumbing work, Mr. William Weir; for the plaster work, Messrs. Wemyss and Livingstone; for the iron and steel work of the retort-house floor, Messrs. Redpath Brown and Co., Ltd.; for the roofs of the workshops, meter-house, &c., Mr. James A. Millen; for the exhausters, Messrs. George Waller and Son; for the atmospheric condensers, Messrs. Clapham Bros., Ltd.; for the water-tube condensers, Messrs. Kirkham, Hulett, and Chandler, Ltd.; for the coal-conveyors, Messrs. Babcock and Wilcox, Ltd.; for the ammonia scrubbers. Messrs. C. & W. Walker, Ltd.; for the pumping-engines, the Airdrie Iron Company; for the hydraulic mains, Sir Wm. Arrol and Co., Ltd.; for the two tar-tanks, the Brandon Bridge Building Company, Ltd.; for the lap-welded steel pipes, Messrs. Stewarts and Lloyds, Ltd.; for the coal-breakers, steam-engines, &c., Sir Wm. Arrol and Co., Ltd.; for the six tank locomotives, Messrs. A. Barclay Sons and Co., Ltd.; for the producer and flue casings, the Motherwell Bridge Building Company, Ltd.; for the tar-distilling plant, Messrs. A. F. Craig and Co., Ltd.; for the retort mouthpieces, the British Hydraulic Foundry Company, Ltd.; for the patent ammonia plant, Messrs. Ernest Scott and Co.; for one water-tube feed-water heater, Messrs. Babcock and Wilcox, Ltd.; for the high-level coke-platform, Messrs. A. Findlay and Co., Ltd.; for the three coke-conveyors, Messrs. Babcock and Wilcox, Ltd.; for the mild steel casings for the oil-gas plant, the Motherwell Bridge Building Co.; for the truck-tipping carriages, Sir Wm. Arrol and Co., Ltd.; for the mild steel tipping and hopper waggons, Messrs. P. & W. MacLellan, Ltd.; for the lime-kiln casings, Messrs. Millen and Sommerville; for the six cooling-pans, Mr. William Baird; for the seal valves for the hydraulic mains, the Barrowfield Iron Works, Ltd.; for the turbines, Messrs. Parsons and Co.; for the benzol plant, Messrs. R. & J. Dempster, Ltd.; and for the lead work in the sulphate of ammonia plant, Mr. James Costelle.

The end of what has been an interesting and instructive task has now been reached. We are conscious of many shortcomings in the treatment which has been given to a works and plant of such magnitude, and embracing so many highly important engineering features, several of which are peculiar to the site. But it is hoped that, to the extent that we have been enabled to go, justice has been done to the last great work of the designer—William Foulis—and that that work, as traced in these articles, will have its value both in the present and future. The works at Provan will perpetuate in memory the skill of their departed founder; the published description will carry far away into the future—long after Time has placed upon the buildings and plant his depreciating hand, and has wrought changes which may vastly obliterate their present aspect—the knowledge of the labour involved by, and the character of, the works as they exist to-day. Once more we have to thank Mr. Alexander Wilson and his Assistant (Mr. James Lowe) for the kind and generous assistance they both afforded in collecting the material which has been given to our readers.

ELECTRIC LIGHTING MEMORANDA.

The "Journal" Exhorted to Speak "the Whole Truth"—The Whole Truth—The Electric Lighting Extension at Wrexham.

The "Electrical Engineer" has been good enough, in the current issue, to treat us to a pretty little homily, which, coming from such an immaculate quarter, we suppose ought to be taken very seriously, but really—owing, it must be, to our depravity—only amusement can be found in it. The text is the ancient oath, which bids the witness to speak "the truth, the whole truth, and nothing but the truth;" and the comments of the last two weeks on the Wood Green proposed electrical speculation, and the application of the brake by the Local Government Board, supply the grounds on which the moralist of the "Electrical Engineer" sees fit to reprimand and exhort. It is admitted by our contemporary that in last week's comments there is nothing that is not true. For this acknowledgment we are supremely thankful; but "the whole truth" was not told. In those comments reference was made to Erith; and that is where it seems, according to the high standard of our puritanical contemporary, we stepped from the path of virtue. It is charged against us that we hid up "the fact that the last financial year at Erith, which ended with a deficit of £781, happened to be the first financial year of a young undertaking, and that the deficit, after paying capital charges, amounted to £1801 16s. 8d." The writer in the "Electrical Engineer" informs his readers that a copy of the issue containing the homily is being sent to the "Journal," and that it will give him pleasure to see what "the Editor [of the "Journal"] has to say to the whole truth when it is forced on him." Well, the "whole truth" appears to be that, instead of Erith ending with a deficit on their first year's working of £781, it is much worse than we suspected—seeing that it amounts, after paying capital charges, to £1801 16s. 8d. And all we have to say, now that the "whole truth" has been "forced" upon us, so much the worse for the ratepayers.

There is another point to be noticed; and it is that our contemporary sagely remarks that, "if the undertaking were run by a company financed as most electrical companies in this country are, it could and would have paid a dividend of over 2 per cent." This shows conclusively that, if the undertaking had been in the hands of a company, the ratepayers would not have suffered the loss of £1801 16s. 8d. It is on ground opposed to such municipal speculation, and the throwing of unnecessary burdens upon the ratepayers, which private enterprise would prevent, that we have consistently taken our stand. Perhaps, in this connection, our contemporary will excuse mention of the fact that on the Dartford electric lighting works last year there was a net deficiency of £1619; and, if we are not mistaken, the consulting engineers are the same as those associated with the Erith undertaking. But, after all, it is probable that our contemporary is more grieved over the injustice that we did it, in telling our readers of what had happened to Wood Green. We stated that only one electrical paper gave special attention to the matter. It should have been two—the second, of course, being the "Electrical Engineer."

A majority of the members of the Wrexham Town Council appear to be bent on proceeding with the doubtful scheme of extension of their electricity distribution system to which allusion was made a few weeks since. Tenders for cables, &c., required for the first section have been obtained; but, on a technical objection raised by Alderman Samuel when the minutes came before the Council, discussion of the matter could not be proceeded

with. It seems that the usual course is to have minutes printed; but the rule was not followed on this occasion. Alderman Samuel demanded that this should be complied with; and, as he refused to withdraw his demand, and had the standing orders at his back, nothing further could be done before the next meeting of the Council. Perhaps the delay will have a good effect, by giving the members more time to meditate on the foolishness of adopting incandescent electric lamps for street lighting. It is clear that attempts are being made to rush this matter through without adequate consideration.

PERSONAL.

The congratulations to Mr. T. GOULDEN will be many and cordial on his accession to the office so long held by his former chief, Mr. G. C. Trewby. This great mark of their confidence was conferred by the Court of Directors at their meeting last Friday; and so Mr. Goulden's succession has been immediate on Mr. Trewby's final resignation. This gentleman has already commenced travelling, in order to recuperate his health. Last week he was on the Continent; and he will proceed, after a brief sojourn at a health resort there, to Egypt. The time is opportune, on Mr. Goulden passing to his high and responsible position in the gas industry (in which it will be the heartiest wish of all his friends that a full measure of success may attend him), to give a short account of his professional career. The term of his pupilage was spent with the late Mr. F. W. Hartley, with whom he was associated in most of his scientific work; and it was during that association that the progenitor of the calorimeter now sold by Messrs. Alexander Wright and Co. was devised and constructed. The first experiments were made on pure hydrogen and theoretical figures were obtained. The Methven screen was also worked out by Mr. Methven in conjunction with Mr. Hartley at this time; and both these gentlemen read papers upon the subject. Subsequently, Mr. Goulden served Messrs. Alexander Wright and Co. as assistant to Mr. Hartley. In 1884, the subject of this memoir entered the service of the Gaslight and Coke Company as junior assistant at Beckton, on the revision of the staff rendered necessary by the transference of Mr. Trewby to Westminster. In succession, Mr. Goulden served under Mr. Beale (who is now at Nine Elms) and the late Mr. John Methven. On the decease of this gentleman, the Assistant succeeded to the responsibilities of Beckton. As incidents in the history of Beckton and of Mr. Goulden's professional work, it may be mentioned that, in the year when he first went to Beckton (1884), a commencement was made there with retort-house machine work; and it has since been extended to the major portion of the works. The initiation of the first installation of carburetted water gas in this country was part of Mr. Goulden's work, under the instructions of Mr. Trewby; and on its erection Mr. Goulden and Mr. Charles Harris (now of Messrs. Humphreys and Glasgow) actually worked the plant themselves, on both day and night shift—thus giving their own experience and instructing the workmen in manipulating the plant. Shortly after this, Mr. Glasgow, representing the United Gas Improvement Company of America, built their first plant at Beckton; and so was laid the foundation of the extensive manufacture of carburetted water gas now followed in Great Britain. During the time that Mr. Goulden was at Beckton, the manufacturing capacity was increased from 45 to 65 million cubic feet per day; and this, of course, necessitated important additions to the plant. Subsequent events—the transference of Mr. Goulden to Westminster as Mr. Trewby's deputy, the failure of health, and the impending retirement of that gentleman—are all matters which are well within the knowledge of our readers. Mr. Goulden's ascent to the highest engineering position in the Company's staff has, it will be seen, been by certain and well-regulated steps. As the Engineer of such a remote and large works as Beckton, he was necessarily more confined to the routine of his duties than are most of his professional brethren in the gas world. He has, however, received a warm welcome on being in a position to take a more prominent part in general gas matters. He now occupies a seat on the Council of the Institution of Gas Engineers, and is a member of the Advisory Committee of the Institution in connection with the Earl's Court Exhibition.

We learn from the Secretary of the Imperial Continental Gas Association (Mr. R. W. Wilson) that the Board of Directors have appointed Mr. BERNHARD ERNST KÖRTING as Chief Engineer of their Berlin station, in place of the late Mr. E. Drory. Mr. E. Körting is the son of Mr. L. Körting, the Chief Engineer of the Association's Hanover station, and has been in the service of the Association for a period of more than 23 years, having been appointed to the Hanover works in April, 1881. He was transferred in 1891 to Vienna, and in 1900 to Berlin, of which station he was appointed Chief Assistant Engineer in December of last year. The vacancy at Berlin caused by the appointment of Mr. E. Körting as Chief Engineer has been filled by the promotion of Mr. A. F. P. HAYMAN to the position of Chief Assistant Engineer. Mr. Hayman entered the service of the Association at Lille in 1881, and has thus had 23 years' service with them. In 1884 he was transferred to Haarlem, in 1889 to Brussels, and finally in 1898 to Berlin.

On retiring from the office of Manager and Secretary of the Weymouth Consumers' Gas Company, Mr. JAMES LOWE was presented by the office staff and employees in the fittings department with a silver-plated tureen on Thursday evening last, when they invited him to meet them at the Company's offices. Mr. E. Y. Wood, who presided over the gathering, remarked that they were assembled for a purpose which they would like to have indefinitely postponed, and it was to bid farewell to a gentleman with whom they had all been pleasantly associated for many years, and who they regretted was now leaving them. Mr. A. Learmouth, in making the presentation, referred to the long connection which Mr. Lowe had had with the Company, and to the kindness and courtesy he had always shown to the employees under him. He asked him to accept the gift they offered him as a slight memento of the respect and esteem in which he was held. Mr. Lowe said he regretted the time had arrived when severance must take place; but he felt it was desirable that he should give place to a younger man. He accepted their handsome present with the greatest pleasure, and said he should always place a high value upon it. Mr. Lowe has also received from the workmen employed by the Company a present consisting of a silver-mounted ebony walking-stick with ivory handle.

THE GAS STOCK AND SHARE MARKET.

(For Stock and Share List, see p. 58.)

THE Stock Exchange has shown firmness all through the week, for though attention was directed to the fortnightly settlement, yet a fair amount of dealing was done daily. Even on Saturday, which is becoming more and more a *dies non*, after the orders received by post are executed, a fair business was reported. Although there has been some investment orders, yet a good deal of the improvement is due to professional operations; dealers advancing values in anticipation of some of the October dividends being invested. The ease with which the quarterly and monthly monetary requirements were surmounted caused some surprise; for only a little over a million was borrowed from the Bank of England; while in the outside market rates were very light, except one day, when 3 per cent. was paid for call loans. This ease in the monetary situation is naturally reflected upon the value of stocks; and Consols have further advanced to 88½, in spite of the official announcement of the issue of £6,000,000 of 3 per cent. Exchequer bonds. Among other investment stocks which have been in request, several Gas stocks are higher. In fact, a good business has been done in this market; but Gaslight ordinary was the most actively dealt in, and marks a rise of 1 on the week, being now quoted at 94-96. Some dealings were also recorded in the secured stocks; but these are unaltered. South Metropolitan and Commercial likewise met with some attention; while among the suburban group the only feature is a rise of 3 in Lea District "A," 115-120. The most activity in other stocks was in Primitiva; but there was no alteration except in the debentures, which are 1 up, at 93-95. Imperial Continental mark a rise of 3; being quoted 204-207. Buenos Ayres are ¼ up, at 11¼-12; Monte Video ¼, at 10¾-11½; and River Plate ¼, at 11¼-12. There have been four dividend announcements during the week. Alliance and Dublin declare the usual rates of 10½ per cent. per annum on the 10 per cent. shares, and 7½ per cent. on the 7 per cent. shares. The Cape Town and District Gas Company announce an interim dividend at the rate of 4 per cent. per annum, the River Plate Company an interim dividend of 6s. per share for the half year ended June 30, and the Buenos Ayres (new) an interim dividend at the rate of 6 per cent. for the same period. Several stocks were quoted *ex div.* at the end of the month, particulars of which will be seen in our list.

The daily operations show an increase of business as compared with the previous week. On Monday a fair amount of dealing was transacted in Gaslight ordinary between 93¾ and 94½; while more activity was displayed in Imperial Continental, which rose 1, to 202-205. Business was done in San Paulo at 11¾ and Primitiva at 5. Tuesday was comparatively a quiet day; but business was done in Gaslight 3½ maximum at 87½ and 88¼, ditto ordinary at 94½, and South Metropolitan at 125¾ and the debentures at 87¾. There was more doing on Wednesday; a fair business being recorded in Gaslight ordinary between 94 and 95. Bombay marked 6¼, Continental Union ordinary 102, Imperial Continental 204, Primitiva ordinary 5⅛, ditto preference 4⅛, and River Plate 11⅝ and 12. Thursday was also a quiet day; but Gaslight ordinary marked 94⅜, the 3½ per cent. maximum 97½, while some special business was done in the 3 per cent. debentures at 97. Imperial Continental changed hands at 204, and Continental Union at 103. On Friday, there was more activity in Gaslight ordinary; several dealings being recorded at 95. The 3½ per cent. maximum marked 88½, Commercial 110½, ditto 3⅓ per cent. 105½, and debentures 84. Dealings were recorded in Buenos Ayres at 11⅜, European at 20¼, Imperial Continental at 204 and 205⅛, Primitiva ordinary up to 5⅛, South Metropolitan at 126, and Wandsworth 3 per cent. debentures at 78½. There was very little business indeed done on Saturday; but Gaslight ordinary marked 95, Imperial Continental 205⅓, and Primitiva 5 per cent. preference 4½.

NORTH OF ENGLAND GAS MANAGERS' ASSOCIATION.

HALF-YEARLY MEETING AT HARROGATE.

Under most favourable conditions, the 55th Half-Yearly Meeting of the Association was held at Harrogate on Saturday, the head-quarters being the George Hotel. The business meeting was held in the Recreation Room—Mr. E. E. J. ANDERSON, of Middleton (President), occupied the chair, and was supported by Mr. Mathew Leaf, of York (the Vice-President), Mr. F. Barber, the Solicitor to the Harrogate Gas Company, Mr. C. Greenwood, one of the Directors, Mr. H. Wilkinson, the Secretary, Mr. G. Sayner, the Engineer and Manager, and Mr. Herbert Lees, of Hexham, the Hon. Secretary of the Association. There was a large attendance of members.

The PRESIDENT, on taking the chair, introduced Mr. Frank Barber, the Acting Chairman of the Harrogate Gas Company, who desired, he said, to say a few words of welcome to the Association.

Mr. BARBER said he need not trespass very much upon the brief hour which, he understood, was apportioned to the business of the day; but he had to deliver a short message to them. He had to express, on behalf of the esteemed Chairman of the Harrogate Gas Company, his regret at his inability to be present. The Chairman was, however, prevented entirely from being present in consequence of indisposition, which made the regret of all present more extreme. The Harrogate Gas Company appreciated very much indeed the fact that the Association had selected Harrogate for the place of the meeting. He (Mr. Barber) was delighted to see assembled in such large numbers the members of the Association; and he could only say that they regarded it as a very great compliment to Harrogate, and he hoped it would give the same entire satisfaction to the gentlemen present. He thought they would find in Harrogate very much beauty, which would give them pleasure; and in their public institutions of the town that it had been arranged they should have the privilege of visiting, they would find matters of considerable interest. It only remained for him to say, on behalf of the Harrogate Gas Company, that he bid them welcome, and to hope that the meeting would be a successful and an enjoyable one in every respect.

The PRESIDENT, on behalf of the Association, thanked the Directors of the Harrogate Gas Company for the hearty welcome they had given them.

The HON. SECRETARY, in the course of some formal announcements he had to make, said that the Committee of the Association had had a communication from the Exhibition Advisory Committee of the Institution of Gas Engineers asking if arrangements could not be made for members to visit in a body the exhibition at Earl's Court. Mr. Lees pointed out that it was difficult to make definite arrangements at the present time; but it was desirable that as many members as possible from the North of England should visit the exhibition simultaneously. It would facilitate his work if the members would intimate to him what part of the month during which the exhibition would remain open would be the most convenient time for them to attend, and then arrangements would, if possible, be made for the number who would go from the North of England together.

The PRESIDENT then proceeded to deliver his

INAUGURAL ADDRESS

Gentlemen,—The position I occupy to-day is one for which I wish to thank you most sincerely. It is a great honour to be your President; but I feel that there is a large amount of responsibility involved. However, I hope, with the aid of the worthy Secretary, to be able to hand over the duties of the Association as unsullied as I received them. The position of President is a most important one in all Societies; but when an able, willing, and courteous Secretary is at his elbow, it greatly relieves him in the heavy duties connected with it.

THE ASSOCIATION.

I am pleased to be able to say that we have added to our list during the past year fifteen members and associates, and received one or two resignations; but as we transfer our duties to various parts of the country, we can but naturally expect that the various Associations receive or lose our presence. During the past year, we have fully discussed the various items in the Amalgamation Scheme proposed by the President of the Institution; and after particulars of which we have already given full details, we decided to become a unit in the gigantic scheme—which I hope will bear good fruit, and finally become a necessity to the well-being of the District Associations.

I cannot say that I agree with the President of one Association in saying that the Institution should be used as a medium for providing papers; for I think that this would be the first stage in the decline of the District Associations, instead of strengthening them. What I suggest is that more members, and especially young members and also members who are managers of small works, should not be so bashful, and though there may be slight inaccuracies in calculations, &c., come forward with their ideas, difficulties, and actual workings more freely. The resulting discussion would not only be of great advantage to them, but also to managers and engineers of larger works who cannot possibly be expected to devote any great amount of time to one particular thing, as that is generally left with the departmental foreman.

CARBONIZING.

This is the most important of a gas manager's duties; and I am afraid that it is one of the most neglected, as it is far too much left to the subordinates. If we do not obtain the gas from the retorts, we cannot by any means, however good, put it into the holders.

If I may be allowed to offer a suggestion here, as there has never been so much variance as to the best method to adopt as at the present time, it would be well for each manager to spend several hours every day in his retort-house trying the best possible way to obtain the highest possible results from the system he has at his command. If you watch the Technical Press week by week, and try to form an opinion from it as to which is best, I am sure you will be further from doing so each week; for you read of one man obtaining certain figures from one system, and lower down you see an account of another man condemning the same system—for what is food for one is poison to another, owing to local circumstances. What should be given in every instance is the candle feet per ton accurately and carefully obtained from a number of days' practical working, and also the candle feet obtainable from a careful laboratory test. This will then enable you to have comparative figures; for what earthly use are inclined retort results to a man who has a works entirely built for horizontals or *vice versâ*. The same thing obtains in regard to machinery. But if we can arrive at some fixed basis for comparison, it will be a boon to a great many managers, who obtain figures from various towns which are compared favourably or otherwise with those of their own, and often to their discredit, owing to no fault whatever of theirs, but caused entirely through local circumstances. Through publication of financial and yearly results, the public, who are entirely ignorant of the various methods, compare them with other towns, and generally to the discredit of their own Manager.

RETORT-HOUSE.

In this department, I think that at the present time every manager, engineer, or director needs his keenest faculties to be able to advise his committee as to future extension. We have the vertical retort in its comparatively early stages. This will have to make very rapid strides and improvements, if it is to be a keen competitior with the older systems, for it does not seem to be making any great progress at present; and this must certainly be looked upon with a degree of uncertainty as to its qualities. Of the inclined retort, we can now say that it must be something good, to remove an installation; yet it is receiving a severe check by the new means of using horizontal retorts with projectors—viz., De Brower, turbine, and the Fiddes-Aldridge—all of which have their own little peculiarities.

As regards the first, we need to wait a little time before deciding on this means of charging so as to be able to get the wear and tear charges necessary for its good condition; also as to whether the belting will in any way become affected, if used continually for several hours, by the heat which will necessarily be caused. In the turbine chargers, we have a good machine, but to my mind only suitable for large works; and as there are few in our district, I think we need not trouble to waste time upon it. The Fiddes-Aldridge seems to be a most suitable machine for medium-sized works; but we have now another system of manufacture put before us in a practical form—viz., the suggestion made by Mr. Matt. Dunn, one of our Ex-Presidents, that we must look for any great advantage in carbonizing to the coke oven principle.

As you will all be aware, this is now being done at Royston, and the gas obtained enriched by benzol and delivered to the consumers; and if this system can be worked on an extensive scale, it will completely revolutionize the manufacture of power gas, of which many of us have been afraid lately. To my mind, no committee need let power gas trouble them, if they will only take in hand the letting out of gas-engines on the hire-purchase system; for that will effectively remove the obstacle which gas-engine makers have, and prevent them from canvassing towns to obtain orders and then recommending power gas as the means of driving. My Committee have at the present time this matter seriously in hand; for it will enable us to compete with the electric motors which are lent out on these terms, as gas-engines are now so perfected that electric motors cannot compete with them from an economical point. We have here a very good field opening up to us; and the electrical engineers will be called upon to confine their province to the drawing-room.

ENGINEERING.

As this item has occupied a great deal of time and space lately in the Technical Press, I will dwell a short time upon it. We all know that there are engineers and engineers, exactly as there are stokers and stokers; but why the one should be held to a certain amount of ridicule and contempt because of the others, I am

totally at a loss to see. One man may be a very able man at a medium-sized works, but a total failure at a larger one, owing to his not having the capacity or forethought necessary for the more rapid movements of the one over the other. But do you not think the remedy is entirely in our own hands? You must see the rapid increase in numbers of companies and committees who advertise "State salary." This is done for a dual object. The one is to see who will apply, and the other is to try to get a good man cheap. But it has its deleterious effect; and that is that men put in at ridiculously low figures who are not at all competent for the work, and thus obtain the office purely through the miserable sum they state. Now this can be avoided by managers having a kind of combination or friendly understanding, and following the lines of other professions and fixing a scale for the various sizes of works. We have only to look round and see good men receiving a mere pittance of a salary for a large works, and also good men in small works receiving double and sometimes treble the amount of their colleagues. Of course, this is called a stroke of Dame Fortune; but I feel sure that if a more amicable feeling were brought in, she would be asked to be a little more careful in her selection.

In concluding these remarks, I feel I am bound to offer some comment upon the recent charges made against us as a body by a trade paper, and say that if there is the slightest truth in them—which I most sincerely hope there is not—committees have themselves to blame for not giving their servants due reward for their services. And on the other side, why, if traders know that their commodity is worth more than they are obtaining, do they descend to such underhand tricks to get a sale? A good thing advertises itself; but a bad one always needs a lot of pushing to get a place, and then a lot of bolstering to keep it there.

"O mortal man in every act beware,
Since one wrong step may mean an age of care.
Ever thy credit keep—'tis quickly gone;
Gained by many acts, but lost by one."

Lighting.

This is an item requiring a large amount of care and discretion on the part of a manager; for the same light or the same burner will not suit in every case, and so it requires the manager to keep himself in touch with every kind of light, and advise consumers accordingly. For instance, church lighting, school lighting, and shop lighting, require very different arrangements and styles to domestic lighting. Shop lighting will require subdividing according to the style of shop, and also its use for various articles.

A gentleman once said that he preferred electric light because of its nimbleness; but I think that the various systems now on the market for instantaneous lighting, both for private and public buildings, will require very little improvement to be quite equal, if not superior, to any electric work. In a large town I visited not long ago, I found a system of arc lamps in vogue numbering about forty. Each one required turning on separately, and so needed a lamplighter, which must necessarily be an expense, and one which we are always trying to reduce. I have also had the pleasure of witnessing the lighting of the main avenue of the Bradford Exhibition, and was delighted that so simple and effective an arrangement had been put upon the market. The lighting was all that could possibly be desired; and I am informed that the mantles last, if anything, longer on this system than on any other. For private lighting, I have for some time had an arrangement in my office for switching on the gas by an ordinary electric bell-push placed at the side of the door; and up to the present it has given every satisfaction. I only hope it will be a permanent success, and be put on the market at a lower figure. For window lighting, and also lights high up in the ceiling, it will be a boon, and will doubtless have a big demand in the future.

High Pressure.

This is another point upon which we need to give plenty of time and thought; for with the ever-increasing demand for gas, the question will be, Shall we deliver at high pressure and relay a large portion of our mains, reducing by means of valves, &c., for some of the lower class districts, and thus keep the leakage account low, or shall we encourage the high-pressure machines for the various large areas? There is no doubt that this system is a great benefit; for in one cotton spinning mill I displaced three out of every four burners (which numbered about 300) and gave a much more satisfactory light to the operatives. The system was the Keith-Blackman; and instead of the usual water power being used, we had a pulley put on the mill shafting. It has been so completely successful, that we are now in negotiation with over a dozen more mills, some of which have their own electric installations. In another cotton polishing mill, I displaced more than fifty ordinary burners by two Lucas lamps. These have given complete satisfaction in the distribution of light, which was so defective that we were nearly losing a customer. Another mill, I have completely fitted up with "C" burners having 14-inch shades and anti-vibrators. This is slightly cheaper in the first outlay, but not nearly so cheap in the long run. Yet another mill is in hand; but this time silk weaving is the occupation, and I have advised the use of inverted lights on account of the illumination being required below the line of vision.

In church lighting I have also had some experience; for at the Parish Church the Vicar and Wardens had decided to install electric light, and approached their Architect as to the best effect and position for the lights. I saw the Rector, and asked to be allowed to show what could be done by gas; offering to fit free two bays in the nave. This was accepted, and after three months I received the order to complete the whole building and render an account for all work done. We have 73 inverted lights, displacing 184 burners, and giving so much light that often not more than two-thirds of them are in use. We have had no difficulty with lighting-back. At a chapel, I displaced 222 burners by two 600-candle power Lucas lamps and ten inverted lights. Here we have not had a single mantle broken; and the work has been completed over twelve months. For shop lighting, a most pleasing effect is the use of a number of small inverted lamps suspended by flexible tubing about ¼ inch diameter. This to the ordinary observer cannot be detected from electric light, except for its brilliancy. The system is largely in use at Hebden Bridge.

In concluding, I can only say, Keep to the front. Keep every new light keenly under observation; and advertise! advertise!! advertise!!!

Electrolysis.

I have now had three years' working in my present town, with the mains completely interlaced with electric cables. But up to the present I have not experienced any inconvenience from this cause; and as all the cables were laid under the direction of our Electrical Engineer, who is a very careful and conscientious man, I am hoping that in my case I shall be spared any anxiety about electrolysis.

The Middleton Gas-Works.

In conclusion, I will give a few details of the works over which I have control. They were purchased from a Company in 1861, for the sum of £8000; and immediately on the completion of the purchase, the sum of £10,000 was spent—showing that the works were practically worn out. But Parliament does not take these things into account, and in our case awarded perpetual annuities at the rate of 10 per cent.

Our retort-houses are one inclined and the other direct-fired horizontals. I may here say that personally I am a machine-man; but I can always adapt myself to the situation, and we are obtaining 11,150 cubic feet per ton of 19½-candle gas (average for two years) from Yorkshire and Lancashire coals used in about equal proportion. As this is enriched by benzol only 2 candles, I am sure it will need some beating. Our condensers are what are known as horizontal pipe condensers; and they are very effective in their work. The temperature in the foul main is about 125°, inlet of condenser 116°, and outlet of condenser 65°. The scrubbers are rather old-fashioned, but still doing good work. The purifiers are eight in number, four containing oxide and four prepared lime; six always being in action. Our maximum daily make is nearly 900,000 cubic feet; and our storage capacity (consisting of two holders, one double lift, and one four lift) is 600,000 cubic feet. But in the mill district this is not sufficient, as the mills, shops, factories, &c., all come on at once, and for a comparatively short time the demand is so severe that sometimes we have had to be prepared with the extra retorts to enable us to maintain a fair pressure.

Sulphate of Ammonia.

In this branch—which is a very profitable one—managers must not be too sanguine about the figures which are being so much mentioned in connection with the Mond process; for I very much doubt if they will be obtained in actual working. Another point for consideration is the great variance in the composition of coals from different districts.

Prepayment Meters.

This system is one of the best branches we have; for the cash is always there, and so saves a lot of trouble in deposits, guarantees, &c. In Middleton, we have nearly 2000 of these meters in use; and in nearly every instance we fix a cooker, packed and enamelled, costing about £3, at a nominal quarterly rental of 6d. We have had practically no trouble from dirty stoves, as the tenants take a pride in keeping them clean—so much so that if a tenant leaves he invariably asks for the stove to be removed to the new house. This we do if the tenant pays the cost—not otherwise. Our slot meter consumption has increased in three years from 2 million to over 10 million cubic feet.

I will now thank you, gentlemen, for the kindly way you have received me, and

"I'll not willingly offend,
Nor be easily offended.
What's bad I'll try to end,
And endure what can't be mended."

Mr. H. Wilkinson said he felt it a great honour to be asked to propose a vote of thanks to the President. It was a proposition which required few words to commend it to them, as the President was too well known to the members of the Association to require any support from him. He was quite sure that the fact of his unanimous appointment was sufficient indication of the esteem in which he was held—not only by the members of the Association, but by others he was pleased to see from the Midlands and other counties. The address they had just listened to stamped the character of the President; and he felt sure the hope he expressed at its commencement—that he would hand over the duties

of the Association as unsullied as he received them—was a foregone conclusion. They had been interested by his address; and he was sure that in it there was matter for them to consider, and probably derive advantage from. It had certainly been most interesting. The position of President was not only an honorary one, but one of great dignity and (from what he had seen of his work) it was also one which involved a serious amount of work. Their vote of thanks therefore was due to him; and he had pleasure in proposing one.

Mr. F. J. Bancroft (Hull), in seconding, referred to the fact that he had some knowledge of the presidential duties and the amount of labour involved in the preparing of such an address. He also referred to the pleasure it gave the managers to see round their President's works when he was at Ripon some little time ago.

Mr. M. Leaf (York) supported the proposition, which was carried with enthusiasm.

The President sincerely thanked them for the vote.

Thanks to the Corporation.

Mr. W. D. Gibb (Newcastle) said that all the members of the Association had recently received an exceedingly interesting pamphlet in which the attractions of Harrogate were set out in a most artistic manner. No doubt in preparing the pamphlet they had a very easy task; for they certainly had a number of attractive features to set out in its production, and were more fortunate than many neighbouring surroundings. As far as the members of the Association were concerned, it was sent by the Corporation free, and the members owed them their thanks. They as an Association appreciated all the kindnesses shown to them, and he had pleasure in proposing a vote of thanks to the Mayor and Corporation.

Mr. E. F. Hooper (Sunderland) seconded, and the resolution was cordially carried.

The President remarked that the Mayor of Harrogate would be present at the subsequent luncheon, and would then respond to the vote.

The Technical Classes in Newcastle.

Mr. W. Hardie (Tynemouth) thought they should not part that day without a word being said about the work being done by the "Gas Manufacture" class connected with the Association. The question was mooted some time ago, and a class was started at Newcastle by the Association, assisted by the Rutherford College. They were successful at the time in getting their friend Mr. Lees to become Lecturer on "Gas Manufacture," and the lectures and meetings had been carried on with great success during the past winter. The students who entered that class numbered 22, with an average attendance of 16. Of these, 14 sat for the examination; and the results were very satisfactory and a credit both to the teacher and to the pupils. Of first-class passes, there were 7—including a second prize and a bronze medal—and two second-class passes. For the present session, 9 had entered for the honours grade class and 19 for the ordinary class. The undertaking was going on in a most successful way. As regarded grants, they were not able to receive any grant from the City and Guilds of London Institute or the Board of Education or any other Education Department in support of the classes. Last session they asked the local Gas Companies to assist them in carrying out the scheme; and to an extent they were successful. But if the classes were to be carried on, he was afraid they would again have to apply for assistance; and he trusted they would get the same help as upon the last occasion, and if possible a little more. They were all agreed that technical education was desirable; and therefore he considered they should in some way or other endeavour to support the scheme as far as they could. The students attending the classes from a distance had been able from a local education association to receive some assistance towards their travelling expenses.

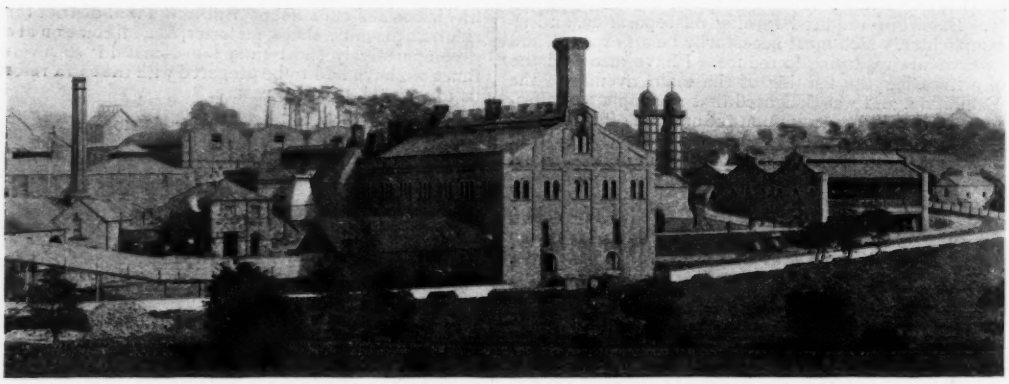
The business proceedings then terminated.

The Luncheon.

The members were subsequently entertained to luncheon by the Directors of the Gas Company at the George Hotel. Mr. F. Barber occupied the chair, and was supported by the Mayor of Harrogate (Alderman H. Milling).

After the usual loyal toasts, the Chairman gave "The Mayor and Corporation;" the toast being responded to by the Mayor in a humorous speech. He gave the members a hearty welcome to the town. Mr. M. Leaf (York) proposed the health of the Directors of the Harrogate Gas Company. He said that the Association met that day under circumstances which were quite unique in the history of the Association. The autumn meeting had generally been held in the town where the President for the time being resided; but their President on this occasion lived a considerable distance away from what he might call the ground covered by the Association, and so Harrogate was selected. If they had picked the country through, they could not have selected a better place than Harrogate, or one that would give greater pleasure, in which to hold their meeting. Mr. Barber responded. Mr. Geo. Helps (Nuneaton) gave the toast of "The North of England Gas Managers' Association," which was responded to by the President. The toast of "The Chairman," proposed by Mr. Lees and responded to by Mr. Barber, concluded the toast-list.

The members afterwards went for a drive—viewing the principal places of interest in the town; and the weather being delightfully fine, the drive was thoroughly appreciated.



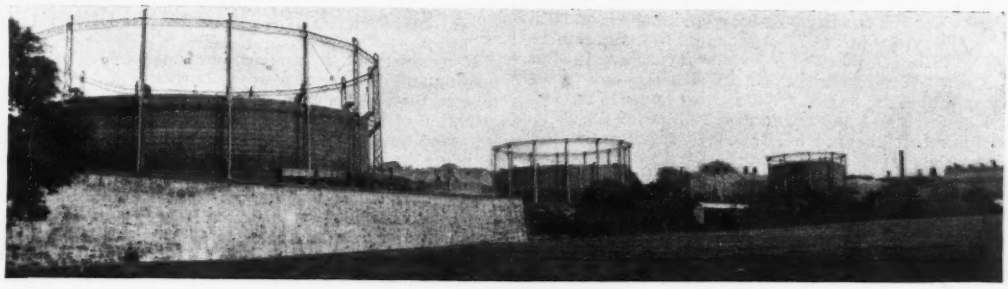
General View of the Harrogate Gas-Works.

THE HARROGATE GAS COMPANY.

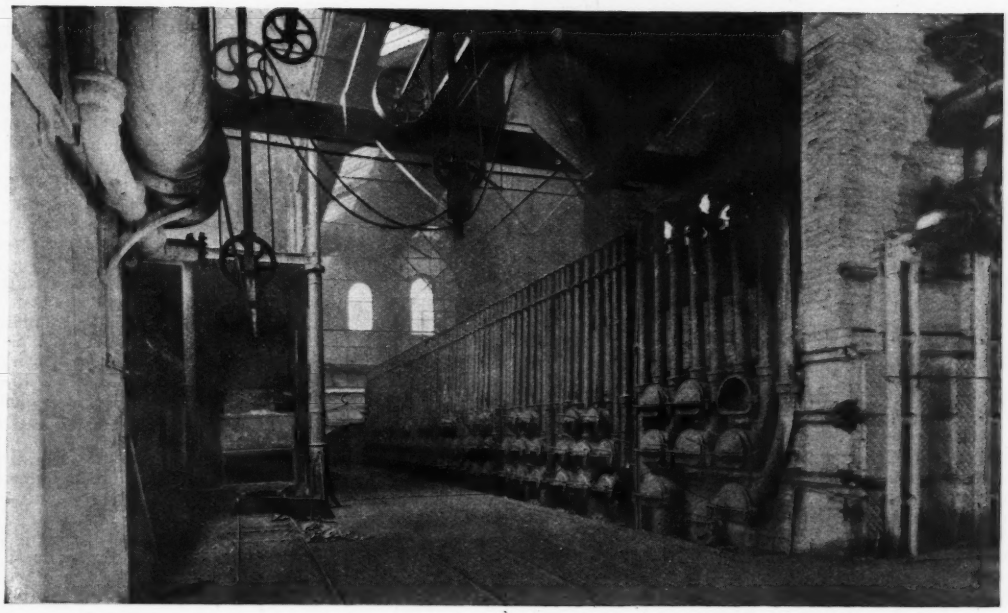
The Harrogate Gas Company was formed in 1845, and obtained their first Act of Parliament in 1846, with an authorized capital of £10,000. The undertaking was then of limited dimensions, but adequate for the small, straggling town of Low and High Harrogate, as the place was then known. But in 1863, the annual consumption having reached nearly 12 million cubic feet, additional powers were sought and obtained. Supplementary powers were secured in 1880; and the last Gas Order of 1897 raised the authorized capital to £237,071, of which £168,548 has been paid up. The Company therefore rank as one of fair proportion.

The make of gas last year (1903) was 261,460,000 cubic feet. Gas consumption in every form is encouraged; and a large business is done in the sale and hiring out of gas cooking and heating stoves, a special feature in connection with which is that, if the consumer so desires, the gas can be registered separately from the ordinary supply—thus affording a check upon the consumption, and giving the consumer the advantage of 5 per cent. additional discount. As an indication of how fully the system has been adopted, it may be stated that 81,543,300 cubic feet were so registered last year. Although in a fashionable watering-place like Harrogate there is not much scope for prepayment meters, a fair measure of success has been attained; 1653 of such meters being fixed, with an annual consumption of 18,295,100 cubic feet. The Company carry on the business of gas-fitting, having show-rooms and a well-arranged front window at their Chief Offices for the display of up-to-date fittings and stoves. In the area of supply, there are 55½ miles of main pipes, varying from 2 to 24 inches, and a constant demand for extensions into outlying districts, which are being developed for building purposes. The consumption shows a steady increase, notwithstanding the keen competition of the electric light, which is in the hands of the Corporation.

Any reference to the developments of the Company would be incomplete without mention of the name of the late Mr. Peter Hains Wilkinson, to whose energy and ability much of the success of the Company is due, and also to Messrs. Newbigging and Son, who, as Consulting Engineers, some years ago carried out considerable extensions of the works. The chief officer of the Company is now Mr. Harry Wilkinson, who has seen 40 years' service with the Company, and is ably supported by the Works Engineer (Mr. George S. Sayner), Engineer's Assistant, Works and Outdoor Superintendents, and Clerks.



View Showing the Three Gasholders.



The Generator Settings, Showing Coal Bogie for Hand Scoop Charging.

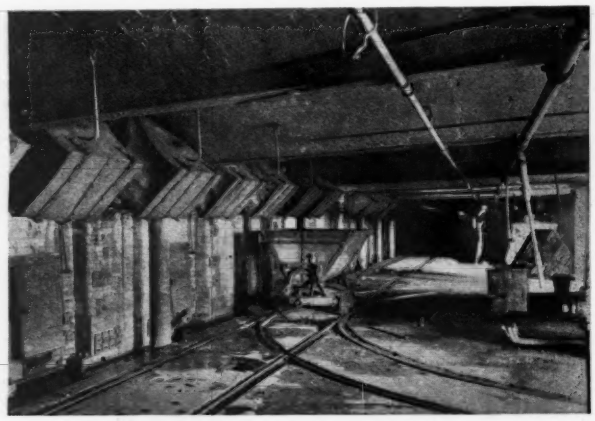
The Regenerative Retort-Settings, with Deighton's Manual Charger in the Foreground, and the West Machines Beyond.

Description of the Gas-Works by Mr. Sayner.

The works are situated nearly two miles from the railway siding, consequently the haulage of coal has been a special feature; all the material to and from the works having to be conveyed by traction waggons or carts. Their arrangement is shown in the general view.

Coal-Stores.—These are necessarily of large capacity (7000 tons) having special unloading arrangements, entailing a minimum of labour, into the hoppers. It is released by slides at several points, and worked by hand-wheel on rack and pinion, falling into 1-ton bogies, which one man moves to the coal-breaker, some distance away, at less cost than could be done by conveyors.

Retort-Houses.—No. 1 is 102 ft. by 84 ft., containing 144 mouthpieces on 20 in. by 13 in. retorts, and 16 on 22 in. by 16 in. retorts, heated by deep fuel-economizing generator furnaces. In this house hand-scoop charging is entirely in use, the coal being supplied from special filling bogies. No. 2 retort-house is 118 feet long and 64 feet wide, and contains 128 mouthpieces on 22 in. by 16 in. through retorts, heated by Brearley's regenerative furnaces. This house is fitted and worked by West's coal-breaker, elevator, and manual stoking machinery, supplemented by Deighton's manual charging bogie and scoop. A double-rake discharger deposits the coke into special slaking hoppers (see small illustration); the water being sprayed from taps turned on by the stokers. The productive capacity of the whole is 1½ million cubic feet per day, allowing for contingency benches being off.



THE FURNACE FLOOR, SHOWING COKE-SLAKING HOPPERS.

Condensing Plant.—This consists of one three-tower Clapham water-tube condenser for a million cubic feet, and one of Morris and Cutler's horizontal water-tube condenser for 750,000 cubic feet per day. The water required is obtained from a well.

Exhausters.—There are three of these, of Bryan Donkin and Clench's "Beale" type. One of these is for 90,000 cubic feet per hour; the second, for 60,000 cubic feet; and the third (which is to be dismantled), for 30,000 cubic feet.

Scrubbing Plant.—There are two scrubbers, 50 feet by 10 feet in diameter, by R. Dempster and Sons, Limited, of Elland, with a Livesey tar extractor washer in the base of the first one. The capacity is a million cubic feet; but the plant is supplemented by one of Holmes's rotary washer-scrubbers, of the same capacity. Two chambers in the latter are now used for the treatment of the naphthalene by the "Solvene" process, as in use at Derby. This is found to be very effective.

Purifiers.—There is one set of four, each 26 feet square, and of a total area of 2800 square feet, worked by a hydraulic ram in centre of covers. Lime and oxide are used in alternate boxes.

Station Meter.—There is one for 60,000 cubic feet per hour, by the Gas-Meter Company.

Gasholders.—There are three gasholders. No. 1 is 72 ft. by 70 ft. diameter, with two 21-feet lifts, and a capacity of 166,320 cubic feet; No. 2 is 100 ft. by 98 ft., with two lifts, each 22 feet deep, and with a capacity of 338,734 cubic feet; while No. 3 is 146 ft. by 148 ft., with two lifts, each 30 feet deep, and has a capacity of 1,018,300 cubic feet. The total storage capacity is therefore 1,523,354 cubic feet. The tank of No. 3 is 152 feet diameter, with allowance for the addition of a third lift.

Valve-House.—This supports the clock tower, and has a granite tablet commemorating the Jubilee of the Company. All valves to and from the holders are operated here.

Tar and Liquor Tanks.—The capacity is 900 tons.

Governor-House.—This contains one 24-inch Braddock water-balanced governor, with three supplementary district governors. The leading mains from the retort-house to the holders are 20-inch; the main from the holders to the town, 24-inch.

Asphalt Plant.—One steam-heated power-driven mixer (this is a special process) has been put down; the experience being that by power a more thorough mixture is obtained than by hand, and at less cost.

Coke-Breakers.—There are two breakers, both power-driven, and with screening for all sizes and dust. The capacity is 10 tons per hour.

Boiler-Houses.—One contains two Cornish boilers (stand by), and the other a Lancashire boiler, 7 ft. 6 in. by 28 ft. long.

Workshops.—The mechanics' shop is fitted with a lathe, planing, shearing, punching, and drilling machines (all run by power), and two smiths' fires. The blacksmith's shop contains two fires, for which rotary blowers are used. The joiners' shop is fitted with a circular and a band saw, planing and morticing machines, and turning lathe, with engine for driving them.

Laboratory and *Photometer Room.*—These are completely fitted, and include apparatus for testing specific gravity and calorific power, as well as a naphthalene testing apparatus.

A SELF-REGULATING GAS-FIRE BURNER.

It goes without saying that, in connection with the efficiency of heating and cooking stoves, the burner is one of the most important factors. This part of a gas-fire has received rather more attention of late than was the experience of a few years since; but, even now, there are many of the burners which are described as being incapable of lighting back which are not constant in sustaining the boasted merit, and there are still many gas-fires in which no provision is made, as is so very necessary in these days of dissimilarity in gas supplies, for the regulation of the air supply to the burner. At the last gas exhibition at the Crystal Palace, there was a single gas-fire—isolated from the larger and more imposing stands, and which, in consequence, did not attract many inquirers—for which some important advantages were claimed. It was stated that it was impossible for the burner used to light back, that the combustion was complete, that the fire was absolutely silent in operation, that (combustion being complete) there was no emission of unpleasant odours, and that something like 30 per cent. was saved in gas consumption. The burner was the novel part of this fire; and it is the patented invention of Messrs. W. & J. Smith, whose present address is No. 19, Torrens Square, Stratford. Through some unaccountable cause, a full description of the burner has not been published; and the inventors have not been in a position to give to it that publicity which, judging from the documentary evidence put before us, it merits.

The burner is of an exceptionally solid make; and its construction has apparently been the subject of considerable study, in order to amalgamate in it the requirements necessary to produce efficiency and certainty of action. The most striking and novel point is that the regulation of both air and gas supply is the effect of one simultaneous operation—that is to say, the turning on of the gas supply by means of a lever attached to a cock situated centrally in the burner adjusts the air admission to the quantity of gas passing at the time, and yet a little play is given so that the air supply can be further diminished or increased to meet any variation in the quality of the gas. We do not desire to write in excessive terms about a burner with which we have not had any practical experience; but still the importance of the point just made must be acknowledged by anyone who has made a study of gas-fires. It is unnecessary to go into all the minor details in describing the burner; and therefore we will confine ourselves to the main features. A 10-inch burner may be taken as an example. It is composed of four tubes, of 1⅛-inch inside diameter. The inventors have calculated all the dimensions necessary to obtain complete combustion; and the measurements are, of course, varied to suit the size of the fire. The tap is situated centrally in the second tube from the back. The plug of the tap works centrally in a short length of tube; the arms projecting beyond the plug being fitted with perforated caps. Through these the gas is discharged into the burner, travelling from either side, in contrary directions, to each end of the tube carrying the burner nozzles. The situation of the tap and the coiling of the tubes, give to the gas and air mixture a good travel before reaching the nozzles. Over the nozzles is a row of caps, constructed in one piece, and attached to the main part of the burner by screws; and, between these caps and the outlets from the burner, gauze discs are placed.

Now we come to another interesting part. The air supply is controlled at the bottom of the burner by a moveable slide covering the gas-tap. This slide contains a single small slot, through which passes a projection from the lower end of the plug; and operation of both plug and air-slide is secured by a lever passing out to the front and below the gas-fire. By this means, as the gas-tap is turned on by the movement of the lever, the air-slide is also correspondingly opened; as the gas is turned down. the air-slide is correspondingly closed. Yet the slot in the slide is of such dimensions that a little play (about ⅜ inch) is given, so as to slightly increase or decrease the air-supply if necessary. The old form of the burner is being improved in one or two particulars. As originally made, for a 10-inch burner, the orifices of the nozzles were ⅛ inch in diameter. It is now proposed to have a shorter central row of burners behind the front row so as to come more directly under the bed of fuel; and, when this is done, the orifices of the front row will be reduced in size. Another improvement is that in the original form the gas supply was taken in at the top of the burner; it is now to be admitted at the bottom. The burners can also be made with a bye-pass attached; and a further feature is that the front trivet can (if desired) be fitted with a gas-burner below, controlled by a separate tap, for heating kettles, &c.

From a report on the burner by Mr. F. A. Darlington, Assoc.M.Inst.C.E., formerly of the Eastbourne Gas-Works, it is seen that, in his tests, he obtained a good fire, under day pressure, with 20 feet consumption of gas; and, at 30 feet, a perfect fire was secured, which could be sustained at a reduced consumption. Experiments in a closed room showed that the temperature was increased in thirty minutes from 60° to 74°, and shortly afterwards to 76°—the consumption of gas being, at day pressure, at the rate of 24 cubic feet per hour. There was no smell or unpleasant noise; and in no case could the investigator get the burner to light back. Tests by other experimenters confirm the above comparatively low consumptions, even at high pressures. The testimony is all of a high order; and perhaps this notice will cause further inquiry to be made into the claims of the inventors.

SCOTTISH JUNIOR GAS ASSOCIATION.

Annual Meeting of the Eastern District.

The Annual General Meeting of the Scottish Junior Gas Association (Eastern District) was held at the Granton Gas-Works last Saturday. A company of about eighty assembled in the drawing office attached to the new section of the works which is being erected, where Mr. A. MASTERTON, of Edinburgh, the President of the District, took the chair.

The PRESIDENT thanked the members for having appointed him to the office he held. He said it was the first time he had the honour of occupying a position of the kind, and it was doubtful if their choice had fallen on a suitable man; but he had accepted the office, and must do his best to carry forward the work of the Association. He was greatly pleased to see such a large and representative assembly; and had much pleasure in according to them a hearty welcome to the Granton Gas-Works. The Association was, comparatively speaking, small as yet; but he trusted the present gathering would be a foretaste of greater things. He would respectfully suggest that every member should do his utmost to further the interests of the Association, not only by his presence at the meetings, but also by contributing to its life and work, as they had the opportunity, whatever interested them most, in their experience, observation, or reading, in any of the subjects which affected the gas industry. As they had much to do, he would conclude by saying that he considered they were very fortunate, at the outset of their career, in having the privilege of looking over one of the greatest enterprises of the gas engineering world. He trusted they would all benefit from the visit, and would feel that the time spent there had been profitable.

The HON. SECRETARY and TREASURER (Mr. H. Rule, of Falkirk) read the minutes of the meeting held in May last, at which the Association was formed; and they were adopted.

Mr. J. Davie, of Edinburgh, was appointed Auditor to the Association.

PRESIDENT'S OPENING ADDRESS.

The PRESIDENT then delivered his opening address, in the course of which he said:—

In introducing myself this afternoon to you as your President with an address, I feel like what I presume would be the state of mind a clergyman would experience when delivering a trial sermon; and to carry out the idea of a discourse, I have divided my remarks—without a text—into four parts or heads—(1) A short history of the movement which resulted in the formation of the Scottish Junior Gas Association, and the objects for which it was instituted. (2) The education and training of a gas engineer. (3) The benefits which might induce one to adopt the gas profession. (4) A brief description of the Granton works.

The primary credit of suggesting the formation of a Junior Gas Association for Scotland is due to Mr. James Dickson, our Vice-President, then Assistant-Manager at the Broughty Ferry Gas-Works, now of Dunfermline, who published, in the issue of the "Gas World" of March 26 last, a letter embodying this proposition. In May last, a meeting was called in Edinburgh, at which Mr. Herring presided; and those associated with him were Mr. Wilson, of Glasgow, Mr. M'Crae, of Falkirk, Mr. Lowe, of Glasgow, and Mr. O'Connor, of Messrs. James Milne and Son, Edinburgh. The outcome of this movement has been recorded by our Secretary. We have now got our definite arrangements made; and this gathering is convened to inaugurate our first annual meeting. The Association consists of members and honorary members—at present, 88 of the former and 8 of the latter.

I am sorry to state that there has not been a very satisfactory response to the circular issued by the Secretary for the purpose of inviting members to come forward and give their experiences, short lectures, or papers on subjects of interest to us all; but there is still time and opportunity for members to contribute, and we are looking forward to a pleasant and profitable session. I should also inform you that it has been arranged to hold our meetings quarterly on Saturday afternoons; and that Principal Laurie of the Heriot-Watt College has generously granted us the use of a room in the College Buildings, Chambers Street, Edinburgh. I am also pleased to state that excursions are to take place on Saturday afternoons, the dates of which are duly intimated in the syllabus distributed to the members.

You are all aware that the success of an enterprise such as this depends upon the members individually; and I appeal to you to give us your cordial support. The faculty of writing upon scientific matters is not given to everybody; and I wish you to clearly understand that such is not expected here. I would like everyone to feel upon an equal footing; and I assume that many may be prevented from coming forward with papers by the idea that the subjects are trivial. But what I would impress upon you is this—that any subject or matter relating to the science or practice of the manufacture and distribution of gas, or the utilization and disposal of the residual products, or anything in the least way relating to, or connected therewith, no matter how insignificant it may appear, may prove by discussion to be much more far-reaching than the originator anticipated. I have known many instances where valuable hints have been obtained from the reading of papers, and various difficult problems solved. I feel sure it only requires a start; and I shall not be surprised to learn shortly that we have more promises of papers and lectures than we shall be able to find opportunities to discuss to a final issue.

After we get fairly settled down, and into harness as it were, I think it would excite a keener interest if occasionally some debateable subject were chosen, and one member took the affirmative and the other the negative side of the question, and produced all the evidence in support of their different views. To go even a step further, it would be my idea to introduce some forms of rewards for the best papers (such being determined by the Council); and this would introduce a spirit of competition which would give an impetus and an incentive to our proceedings. The Council have agreed that a box should be placed within the reach of members at the meetings, in which any one may deposit a slip of paper with a written question, to which answers and comments will be made at the first opportunity.

It has been suggested that, in order to assist the younger members, and give them confidence in reading papers and taking part in discussions (which is the essential meaning of the organization), a library of standard works should be established, where reference to the most modern publications could be made. I may be pardoned for throwing out a hint that every member should give this matter his consideration, and, if possible, his support, by presenting (say) a book or a pamphlet, as it is only in this manner that a collection of any use can be got together. This may be a little premature; but we must keep it before us, and strive towards its accomplishment.

I shall now proceed to the second part—viz., the education and training of a gas engineer. The claims of education are paramount, not only touching our special lines, but as regards varied and general culture. "Knowledge is power;" and an intelligent and deep interest should be awakened on all the leading questions of the day, reason exercised, and opinions formed on a true and sure basis. There are facilities for acquiring knowledge within the reach of everybody; and patient and intelligent research without flagging is sure to win. It is the best policy for one's future career, as invariably a painstaking and qualified man is preferred to one partially educated to fill an important and responsible appointment. Some may say we are not all talented alike. Quite true; but very often, through carelessness or thoughtlessness, especially in youth, one is apt to neglect the cultivation of the gifts with which he is naturally endowed.

It is desirable to have a thorough, all-round, secondary education; and to those who have not been fortunate enough to secure this, I would strongly recommend that they should attend evening classes on the subjects in which they are not proficient. Some of you may think that I have over-estimated this; but I can assure you that a man who is not capable of carrying on the commercial as well as the engineering and mechanical parts of his business will find himself seriously handicapped in his endeavour to advance himself beyond a certain limit. From experience and observation, I have noticed over and over again that many young men who have been educated at good secondary schools are deficient in the knowledge of their own language and composition, and do not pay sufficient heed to the correct use of words.

To pass on to the mathematical side of the question, under which I include arithmetic, as well as algebra and geometry, you will generally observe that those branches have received scant attention; young fellows evidently being of opinion that they would be of little use to them in after life. But I hold that a man possessing a full comprehension of mathematics is, in nine cases out of ten, capable of grappling with intricate problems, and has generally clear reasoning powers and a well-balanced mind. It would prove to be of great assistance to him in almost every step of his after life. Particular stress should therefore be laid on this study, as you will find that good mathematicians are usually accurate, not only in their own sphere, but also in that of others. Attention should also as early as possible be given to drawing; and the knowledge of freehand will always be found of considerable advantage. Those of you who have been accustomed to examinations will have noted that special emphasis is put upon, and higher marks awarded, in questions where sketches are required.

The next step is for the student to engage himself to a firm of good mechanical engineers actively employed in the manufacture of gas-works plant and appliances, and where he would have the opportunity of being properly grounded in practical work, and a thorough acquaintance with the different materials used and their application would be obtained. But this—materials—should likewise be taken up as a speciality. This should be largely supplemented by attending classes in mechanical engineering and drawing, machine construction and design, and architecture and building construction. Added to this—and I speak from personal experience—a course of civil engineering would be decidedly advantageous. A most essential acquirement—but one usually overlooked in a young engineer's course, whether because of its apparent difficulty or from lack of opportunity I cannot say—is to be able to prepare specifications and schedules of quantities for the various trades. It often happens that this work has to be given out to surveyors, when it really might be done in the premises without having resort to that medium. I may mention, in passing, that the principal engineering shops are beginning to recognize the extreme advantages to be obtained from apprentices attending these classes, and to appreciate the benefits which

will accrue to themselves as well as to the students by this line of study; and so much so is this the case, that these firms are now permitting their apprentices to attend classes during the day—this time being counted as part of their agreement. I understand that some Edinburgh firms have adopted this system. I would counsel him to spend at least a year in the establishment's drawing office; and in this respect the apprentice would realize that the previous acquirement of drawing at his classes would stand him in good stead. During the period he is employed in practical engineering, he should also lay the ground work of his training as a chemist.

He should now endeavour to secure a position in the drawing office of a large provincial gas-works, as opportunities would be afforded there of ascertaining the means adopted for operating the various portions of the plant. He should try to be out on the works as much as possible, and select one where large alterations and extensions are being carried out, so as to observe step by step the process of construction and erection and the subsequent manipulation of the apparatus. During his term in the drawing office, he should be busily engaged in the study of chemistry and chemical analysis, with the view of taking up duties in the laboratory, which I think should be his next move, and from which point the scientific and economical working of each different portion of the plant may be said to be ascertained and controlled. There is another idea I should like to submit to you—viz., that electricity should be included in the curriculum, so that the advantages of gas *versus* electricity may be compared and contrasted intelligently and authoritatively.

It is only within comparatively recent years that gas engineers have recognized in a manner worthy of the subject the part which chemistry plays in the manufacture of gas, and have equipped their works with a first-class laboratory and a staff of competent chemists to investigate the condition of every separate unit of the plant, and ascertain if it is carrying out its functions efficiently, and (if not) what steps would require to be taken to accomplish the objects desired. I should here like to endorse the view taken by Mr. Cranfield, President of the Yorkshire Junior Gas Association, who brought the chemical part of the training very prominently before the members of that body, on the occasion of his Presidential Address in May last. The scheme then outlined by him is one which should be advanced and supported by all interested in the gas industry. Briefly, his idea is that laboratories should be established in all the large centres, completely provided with the latest appliances, and presided over by eminent men in the chemical profession, and where research work could be carried out and all the difficult problems connected with gas-works' plant could be investigated.

This is a praiseworthy idea; and if only gas undertakings would help to contribute the means, there is no doubt as to the ultimate benefits, not only to themselves financially, but to the community generally. In this connection, though not quite on the same lines, I might refer to a privilege granted by the Edinburgh and Leith Gas Commissioners to the chemistry students of the Heriot-Watt College, whereby those who have studied two winter sessions will be permitted to attend at the gas-works for four months during the following summer, and those who have taken three winter sessions at the College will have the privilege of twelve months. Facilities will be granted at the gas-works for them to obtain practical instruction in analyzing producer and furnace gases, coal and carburetted water gases, both crude and finished, and testing in connection with cyanide and sulphate of ammonia plants, coals, limes, iron oxide, tar, liquors, &c.; and this course will make them eligible for taking their diploma in technical chemistry at the Heriot-Watt College. It is gratifying that the Gas Commissioners have offered such opportunities to chemistry students, more especially as Edinburgh bears the reputation of being a seat of learning and culture.

I would recommend, in addition to the subjects already mentioned, a sound commercial training; and what is embraced in that phrase is this—that the student should become conversant with the method of keeping books relating to carbonizing results, materials received and dispatched, sales, wages, &c., and be competent to conduct the commercial correspondence and financial side of the business. I may parenthetically mention that there are many excellent appointments to be obtained in gas-works for clerks acquainted with chemistry and materials and their uses, in addition to their ordinary work; so that any young gentlemen here who are following out that particular line may take note of this, consider it, and act upon it to their advantage. I would earnestly urge the absolute necessity for an engineer being competent to prepare detailed comparative statements of costs, labour, materials, &c., bearing upon the various departments, in order that he may detect the weak spots or satisfy himself as to the efficiency and economy of the working or otherwise. As in every line of life difficulties unforeseen arise and must be overcome, then will be the crucial time to test carefully gathered knowledge. It may be technical, it may be commercial; but in either case you will find a cultivated intellect will triumph when others will fail. Omit nothing, thinking that it is immaterial to know this or that; the more information one can gather the easier will the after experience be.

Up to this point, I have dwelt chiefly upon the theoretical part of education; but it must not be thought for a moment that I undervalue the practical side of it—far from it. I would suggest and advise that a firm grasp mentally of every item connected with gas manufacture, and a complete and perfect understanding of all appliances from the retort to the house burner, should be comprehended theoretically and practically in a determined and purpose-like manner. The best way to accomplish this is just the usual method—to take each separate step and fully master it before proceeding to the next in order of rotation. In fact, if I may be allowed so to express it, one must live on the works, and see and know all systematically that goes on there. Now is the stage to endeavour to secure a position as assistant engineer and manager, where the student would have ample scope to practise and put in force all that he has learned. This will be a stepping-stone towards the appointment of a chief engineer and manager, which is the goal of an enthusiastic young gas engineer's ambition.

When the student's career as an engineer is finished, he must not think that his education is completed. Year by year he will find that he has to be ever on the look out for progress and improvement in every department. The standard works contain the principles; the ever-varying requirements originate new methods. These he must study; and his receptive and well-trained mind will guide him as to the adoption or non-adoption of novelties. Common-sense will keep him right, if he follows its leadings, and is neither too obstinate nor too impulsive, taking every opportunity offered to visit other works, see how the various processes are carried out, weigh up the advantages and disadvantages, and then decide for himself what may be useful and beneficial. I have outlined an ideal standard of education which may be only attained by the few, but which nevertheless is quite within the reach of most young men who decide for this profession.

We shall now take up the third head of the discourse—namely, the benefits which may induce one to adopt the gas profession. Two questions here might be raised—first, Will all this study lead to a compensating monetary result? and, second, Is it worth one's while to take up the gas industry as a means of livelihood? In answer to the first query, I would be inclined to say it scarcely does; but, on the other hand, it has as much to offer as some of the other professions. No matter what one adopts, a long course of training is generally necessary; and only to the few are the emoluments adequate. Still, there are always—though not plentiful—good appointments to be secured, with fairly reasonable salaries attached, upon which a man can live comfortably, married or single. I am of opinion that some of the junior staff positions might be improved upon financially, and given to men of approved general ability and competency, which would raise the status of the office, and attract young fellows of the right stamp to join the ranks. The important thing is for workers to be really earnest, enthusiastic, interested, and qualified; and I feel bound to say they will come to the front, and be eventually recognized and compensated.

The second question I should be disposed to answer in the affirmative. I am aware that a general idea has got abroad that gas has receded into the background since the advent of electricity for illuminating and other purposes; but in order to disprove that fallacy, I shall quote statistical facts from the Board of Trade returns. I find that in 1893—ten years ago—the number of gas undertakings throughout the United Kingdom was 620; and in 1902 it rose to 710, thereby making an increase of 14 per cent. And this occurred during the period in which the electric lighting industry may be said to have made its most rapid development. Again, gas manufacture during the same years was augmented 45 per cent., the number of consumers 70 per cent., and (perhaps what is more astonishing still), public lamps 25 per cent. Then the authorized share, loan, and annuity capital in 1893 amounted to, in round numbers, 82½ millions, and in 1902 to 133¼ millions—an increase of 51 millions, or 62 per cent. Now, to use the words of our National Bard—Robert Burns—"Facts are chiels that winna ding and dawna' be disputed;" so we must accept these statements as authentic, and conclude that this is sufficient inducement for young men to enter this profession. I consider that there is still a prosperous future in store for us, as the use of gas for incandescent lighting and domestic and industrial purposes is ever on the increase.

The President gave a description of the works, with which our readers are familiar, and then proceeded: Operations were commenced recently with the erection of the second section of the works, which is not on quite such an extensive scale, as the capacity of the manufacturing plant is only to be one half the size of the first section, or 5 million cubic feet per day. The retort-house and coal-store at present in course of construction are of practically the same dimensions as those now in use. The carburetted water-gas installation originally employed in the New Street Works, Edinburgh, and having a productive power equal to 2 million cubic feet per day, has been transferred to Granton, and erected at the north end of the new coal-store.

And now I have no doubt you will be glad to hear I have got to the close of this somewhat lengthy discourse. I trust, however, I have not wearied you; and if you have been interested in any degree, I shall feel rewarded if my endeavours will have the effect of stimulating youth to greater efforts and loftier ambitions, and not only in loyalty but in enterprise of becoming useful and worthy members of a renowned Empire which is second to none in the civilized world.

Concluding Business.

The party then walked through the works—a proceeding which occupied some time. In the course of it, Mr. Bisset read a description of the residual products plant in the house in which it

was situated; and the President described, on the spot, the working of the carburetted water-gas plant.

On returning to the drawing office, tea, which had been kindly provided by Mr. Herring, was partaken of.

At the conclusion of the report,

Mr. W. YOUNG (Penicuik) proposed a hearty vote of thanks to the President for his address. He did not propose to criticize the address, which spoke for itself. It had given them food for reflection, and he was sure each and all of them would be greatly benefited by what they had heard.

Mr. W. BROWN (Lasswade) seconded the proposition; and the vote was heartily accorded.

The PRESIDENT, in returning thanks, said he trusted some of their younger members might be aided by what he had said, more particularly with regard to the education and training of a gas engineer. Although none of them had reached the mountain-tops of knowledge, they could, at all events, do their best in the way of bettering their circumstances; and they should have success commensurate with their limitations, and satisfaction in accordance with their desires. He hoped they had all enjoyed their visit to the works, and had received instruction which would be useful to them in the future. He had had a message from Mr. Herring that he was unable to countenance their proceedings; but he (the President) had much pleasure in asking the members to join with him in thanking Mr. Herring for permitting them to visit that immense undertaking. His goodness to them had been still further enhanced by his liberality and generosity in voluntarily providing the refreshing repast of which they had just partaken. The Granton works were designed, and the work carried into execution, by Mr. Herring's ingenuity and skill; and the general public owed him a debt of gratitude for the wonderful achievement the members had just visited. Again, the Association, although not owing its origin to Mr. Herring, had been aided by him. He had identified himself with them as an Honorary Member; and they were proud of the honour.

The proposal was most cordially received.

Mr. T. O'NEILL (Dunbar) proposed a vote of thanks to Mr. Masterton for his services as President.

The PRESIDENT felicitously acknowledged the compliment.

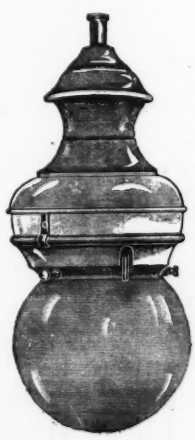
Mr. BROWN proposed a vote of thanks to Mr. Rule, the Hon. Secretary and Treasurer.

This having been acknowledged, and a vote of thanks to the officials at Granton for their services as guides having been accorded, on the motion of the President, the proceedings terminated.

The party then returned to Edinburgh by train.

THE "STAR" MINIATURE ARC LAMP.

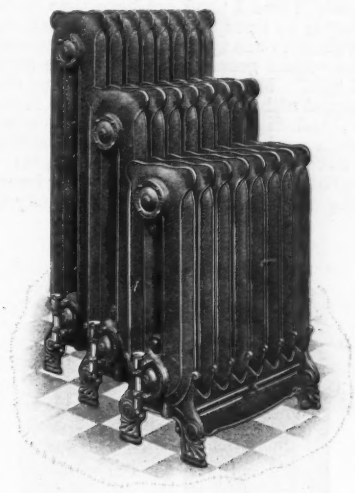
In response to a demand that has grown of late, the Star Inverted Gas-Lamp Company, Limited, have produced a very neat arrangement of lamp, in combination with their inverted type of burner, which will be useful in many positions, both indoor and outdoor, where a cased-in lamp is required. It is called the "Miniature" arc lamp; and this conveys an explanation of the type of lamp that the makers have been aiming at producing, and with success. It is artistic in appearance, easily handled, and moderate in price; and will, for these reasons, find a good scope for adoption.



As the illustration shows, the top of the lamp is very similar to the large forms of the so-called "arc" gas-lamps with which we are now familiar; and this encloses the ordinary "Star" burner. A special feature is that every part of the burner and lamp can be taken to pieces with surprising ease by the hand alone. Dealing with the casing first, means for ventilation are supplied at the upper part. The lower portion of the casing, from which the globe is suspended by screws, is attached to the hood by three bayonet joints, over one of which is an attachment for preventing disconnection through vibration or other causes. In the side of the casing an aperture is provided for lighting-up purposes. The casing is attached at the top to the junction-piece with which connection is made to the gas-supply pipe. Into this junction-piece is screwed the gas-nozzle; and on to this the bunsen tube, from the top of which the three air-inlet arms are carried as in the ordinary "Star" burner. The inlets of these arms are carried outside the hood; so that the supply of air to the burner is not in any way affected (except that it is heated up in its passage through the arms) by the products of combustion. The nose-piece at the end of the bunsen tube simply slides on; and this is renewable at the very modest expense of a penny or so. The combination of the casing and the inverted burner makes a decidedly attractive looking lamp. The consumption of gas is only 2½ cubic feet per hour; and the illuminating power obtained is stated to be 70 candles.

STEAM HEAT WITH GAS FUEL.

Below an illustration is given of a recently perfected apparatus for steam and hot-water heating in the shape of a gas-heated tubular radiator. This is made, in various sizes, by Messrs. John Wright and Co., of London and Birmingham, who, after prolonged experiment last year, succeeded in producing a combination—steam heat with gas fuel—which, it is believed, marks a distinct step forward in the heating of buildings. This year they announce a considerable further development in the introduction of an entirely new design, which, being free from embellishment, is specially



adapted for use where ornamental designs may not harmonize with the more immediate surroundings. The apparatus, both in the new plain design and the existing ornamental patterns, is made in three distinct heights, so as to occupy positions where greater headroom is not available. They are fitted with a patent automatic valve; and it is claimed that the cooling surface is so very greatly in excess of the heating surface, that there is not the slightest risk under any possible circumstances. The installation needs no elaborate scheme; each radiator being entirely self-contained and complete, and can be placed in any position—requiring only a gas-connection. As economizers, many advantages are claimed for these radiators. The boiler, steam-piping, and attendance demanded in the case of ordinary steam heating are dispensed with; and a flue is not required—the consumption of gas, too, being less for the heating of a given space than would be required to light it.

French Hard Glass.—Various reasons have operated to prevent glass of French manufacture being commercially exploited to the fullest extent in this country; but that is not a matter with which we are particularly concerned. In connection with it, however, the Wholesale Fittings Company are going to do their share in making known the qualities of the glass (for gas-fittings use) of French manufacture, and known as the "Silchrome" brand—they having been appointed sole agents for it in Great Britain. It is claimed for this glass that it is in all respects the equal of, if not superior to, the very best of German or any other make. It is said that it is fully 20 per cent. cheaper; and, if this is so, in the eye of the gas manager who has the cost of maintenance before him in matters of street lighting, it will form no inconsiderable factor when making his purchases. The glass is manufactured in the ordinary cylindrical form, as well as in the well-known chimneys with a lateral air supply both for domestic and street use.

The Charging Machinery at the Hanover Gas-Works.—When the German Association of Gas and Water Engineers visited the Hanover works of the Imperial Continental Gas Association in June last, they were considerably interested in the installation of the Parisian turbine charging-machine and the discharging-ram; these being the first that many of them had then seen in operation. The machines were referred to and illustrated in our account of the German meeting. Barely three months have elapsed before the intelligence comes which suggests that the Parisian machines, as the result of the experiment, are to be removed; and their place is to be taken by a complete installation of the West Gas Improvement Company's compressed-air charging and drawing machinery. The contract has been placed after a thorough investigation and inspection of the working of the West machinery at the Crefeld Gas-Works. The machinery is to be installed in the larger of the two retort-houses at Hanover, which contains 22 through beds of retorts. Some information about the settings was published on June 28 last.

KEITH'S HIGH-PRESSURE LIGHTING.

By Mr. G. AIRTH, of Dundalk.

[A Paper read at the Annual Meeting of the Irish Association of Gas Managers.]

During the past three years, intensified incandescent gas lighting has made remarkable headway, and has undoubtedly secured for itself a permanent position in the gas world. The intensification obtained by the aid of auxiliary plant has, in its results, many features to recommend it; and I propose to give you to-day a few of the deductions obtained personally during the last eighteen months. In regard to the question of high-pressure gas lighting generally, I find I shall not have time to fully describe the various plants; so I propose to confine myself, respecting the description of plant, to one system, of which I have made exhaustive trials—the system generally known by the abridged title of "The Keith Light." Many of us during the last few years have felt, are threatened with, or try to anticipate, the keen competition of electricity; and high-pressure gas lighting generally, in my opinion, places in our hands the means of successfully competing with it. We have many instances, not only in this country and Great Britain, but also on the Continent, where intensified incandescent lighting has not only kept out electricity but has even replaced it, and has shown the users a considerable saving. This fact, if any apology for selecting this subject were necessary, would be my excuse.

With the introduction of the Welsbach mantle, the gas world seemed for a short time to rest satisfied as to the illuminating value given. But some of our best engineers saw other possibilities; and the outcome was compressed gas. The two essential points with high-pressure gas lighting are the apparatus for increasing the normal pressure to 8 inches and upwards, termed the compressor, and the burner. Beyond these two, all the other fittings can be the same as would be used with gas at an ordinary pressure. The compressors are made in various sizes, ranging from a small machine capable of passing about 70 cubic feet per hour (of which we have one) to others with a compressing capacity of 6000 cubic feet; and when larger consumptions are required, these can be run in pairs or more. The most popular means of obtaining the necessary power is by the aid of a low-pressure water motor, taking its supply from the ordinary water-mains.

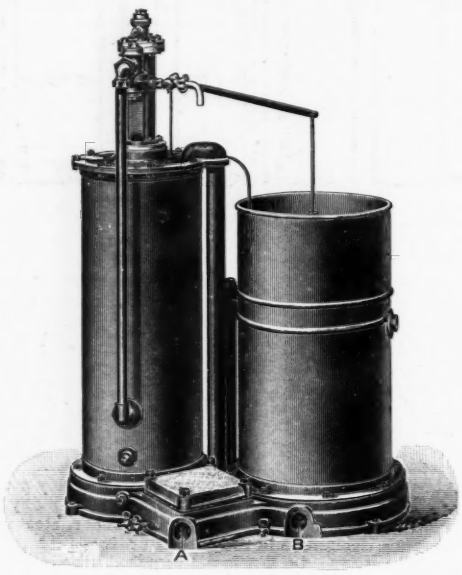


FIG. 1.

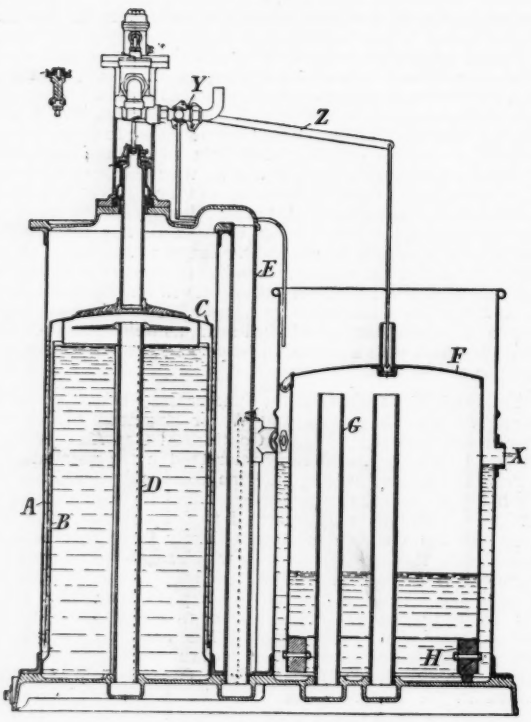


FIG. 2.

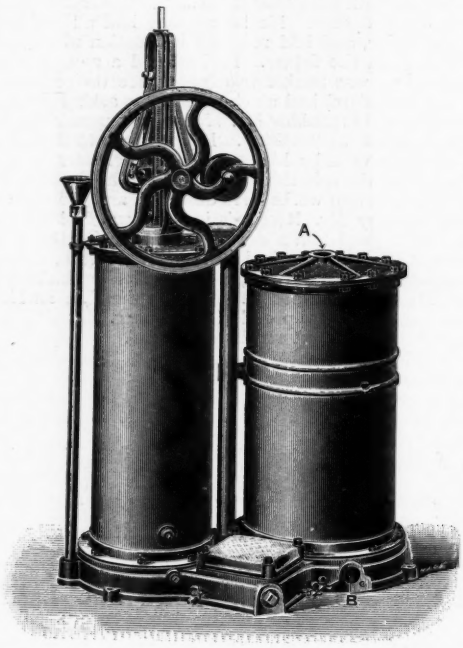


FIG. 3.

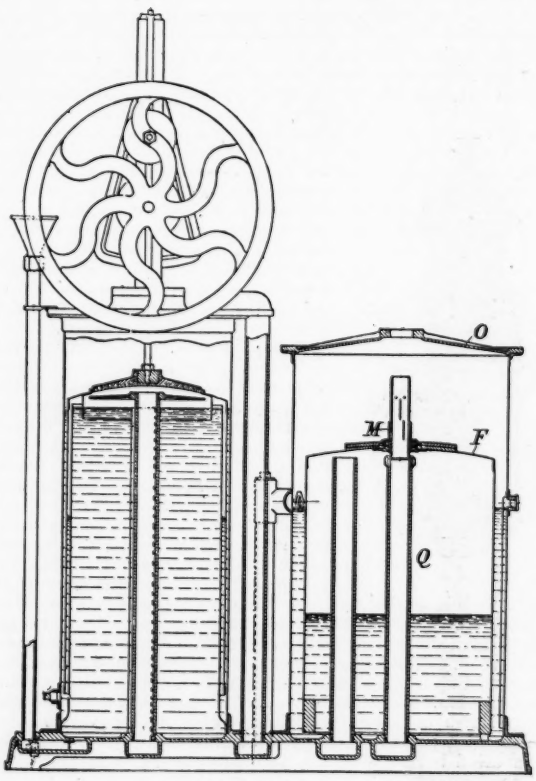


FIG. 4.

This arrangement places high-pressure lighting practically within the reach of all. When this is not obtainable, then a power-driven compressor can be adopted, driven by a small gas-engine, or coupled up to any shafting, &c., that happens to be at hand. Figs. 1, 2, 3, and 4 show medium-sized compressors in elevation and section, each with a compressing capacity of 500 cubic feet of gas per hour. In figs. 1 and 2, we have the compressors coupled with

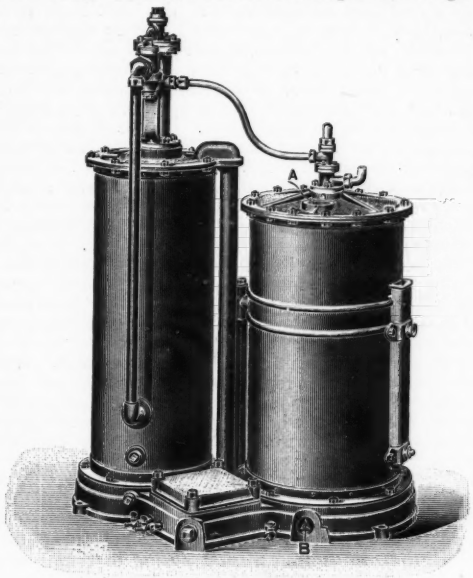


FIG. 5.

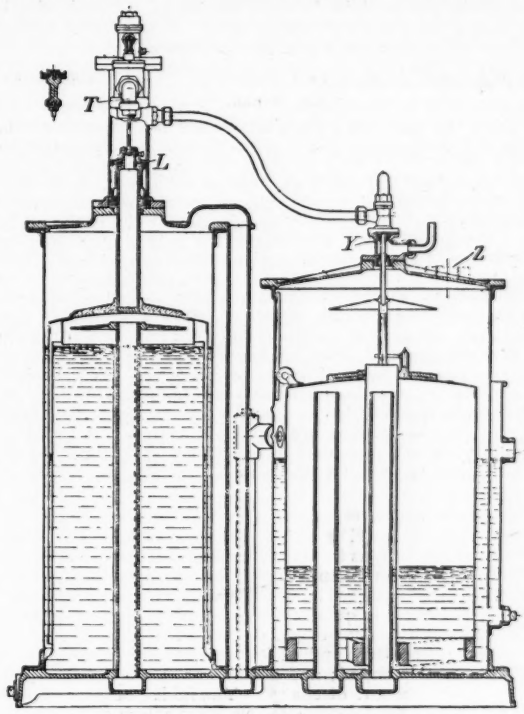


FIG. 6.

a water-motor, and in figs. 3 and 4 we have the same machine, but the water-motor is replaced with gearing for power driving. In other respects the machines are in every way similar.

Referring to the water-driven compressors (figs. 1 and 2), on the left of the section we have the pumping portion, consisting of an outer cylinder A and an inner cylinder B. The space between the two cylinders is filled with water, and forms a deep seal, or lute, into which the bell C dips. This bell forms the piston of the pump, and works perfectly gas-tight and frictionless. The inner cylinder is kept filled with water up to the level shown. The central pipe D serves as a gas inlet and outlet for the under-side of the bell, and the pipe E serves the same purpose for the top side. Each of these has two valves, all four on one level in the base of the machine, and these can be examined by taking off one cover. This valve-box is shown in the elevation, centrally between the two portions of the machine, A being the gas inlet. The pump draws the gas from the main and forces it into the holder F by the stand-pipe G. The holder is weighted by the ring H, and gives the exact pressure required. The gas is finally discharged from the holder to the gas piping and burners at the outlet B (fig. 1).

The gas compressed is regulated in proportion to the consumption by a quadrant cock on the water supply to the motor Y (fig. 2). It will be seen that this is connected by a lever Z to the holder F; the result being that when the water supply is turned on (the gas-valve being open) the pump is started to work, and raises the holder until the quadrant cock is shut off by means of the lever. As the gas is consumed, the holder falls until it again sufficiently opens the quadrant cock and allows the water to cause the motor to take a further stroke. The pumping speed is thereby regulated in exact proportion to the gas consumption; and when all lights are extinguished the bell rises to its full height and shuts off the water supply. This machine can, therefore, be termed perfectly automatic, and allows of the whole of the lighting installation being controlled in the ordinary manner from the burner cock. The seals of this machine are kept at the required levels by the used water from the motor in the compressor, which flows through same, and finally leaves by the outlet X on the holder tank.

Taking the power-driven machines (figs. 3 and 4), of which we

FIG. 7.

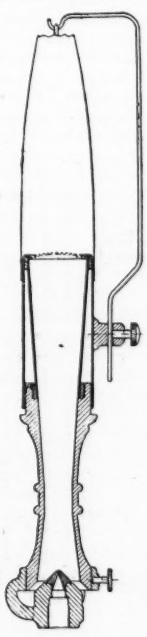


FIG. 8.

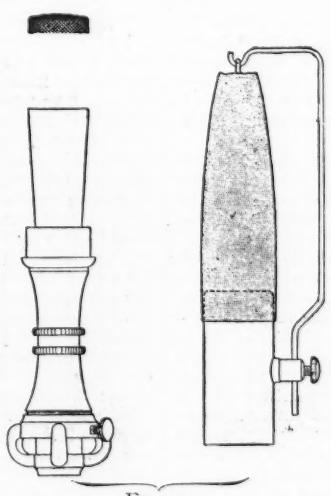


FIG. 9.

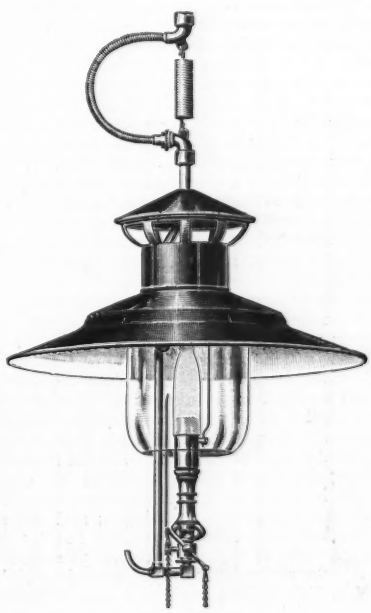


FIG. 10.

have three, the gas inlet is upon the top of the gasholder bell. The reason for this I will explain later. It then leaves the space between the holder bell F and the tank-cover O, and passes down the central pipe Q to the valves, and through the machine in the same manner as the water-driven compressor. It is desirable that this class of machine should run at a constant speed, so it is necessary to vary the governing method from that used in the water-driven machine. This power-driven machine is controlled by the rising and falling of the holder F. The sleeve M, which slides easily up and down the central tube, is made to uncover slots in the latter which are graduated in size from the lower end, allowing compressed gas to pass from the interior of the holder to the low-pressure side. The higher the holder rises, the more is returned, and at a certain height the slots are capable of returning the whole of the gas compressed; but when it falls below these slots, the only outlet is by way of the piping to the burners.

In this size of machine there is a third form (figs. 5 and 6). The water of the compressor is used as in No. 1, but the holder tank is covered in and made gas-tight, and the gas inlet is at *Z* (fig. 6). In this case, as with the power-driven machine, the gas supply travels through the centre of the holder by the stand-pipe T, and the speed is regulated by the valve arrangement shown on the tank cover, actuated by the rising and falling of the holder L. As in the other water-driven compressor, the gas is compressed in exact relationship to the consumption. The object of covering in the holder tank of the power-driven machine is to minimize possible fluctuations of the gas on the inlet side of the compressor, and it will be seen that the movements of the inside of the casing are such as to exactly compensate for the intermittent pulling down of the pump. During its stroke the pump is forcing into the holder a larger amount of gas than is being drawn off; and the difference in quantity causes the holder to rise and displace the same amount of gas in the casing above. Also, when the pump reaches the end of its stroke, there is a period when no gas is being pumped; and during this time the holder falls to keep up the constant discharge. The falling of the holder then draws in gas at the inlet. The combined action of the pump and holder thus causes a constant flow of gas into the inlet of the compressor at the same rate as it is drawn off at the outlet.

When this arrangement is applied to the water-driven compressor, another method of controlling the water supply to the motor is employed. The vertical movement of the holder bell is made to partially rotate the spindle of the regulating valve Y, thus increasing or decreasing the supply; and, in addition, when all the burners are shut off, the holder rises, lifts the spindle, and thus cuts off the water supply entirely.

We will next consider the burner. In fig. 7 we have it in elevation, in fig. 8 in section, and in fig. 9 taken apart for cleaning. The body of the burner is made on the injector principle. The orifice in the nipple is regulated to suit the particular size of burner, and there is a screw arrangement at the base which allows the air to be adjusted in correct proportion to the quantity of gas being consumed. This is, of course, most important, as the air supply can be properly adjusted to suit the quality of the gas, which, we know, varies more or less in every town. Having adjusted this air supply, we have now gas and air passing into our burner in constant quantities, which thoroughly amalgamate as they pass the narrowest part of the burner, and gradually expand, and at the same time reduce in pressure, as they reach the lighting-point.

The chief enemies of incandescent lanterns are dust and vibration. The evils of the first are counteracted in the Keith system by the particular construction of the burner, which allows easy access to its interior for cleaning. The gauze cap forms the only part on which dust is liable to collect. Fig. 9 shows the burner taken apart for cleaning. The upper portion can be removed without breaking the mantle; thus exposing the gauze cap, which should be taken off and cleaned by blowing upon the top side, or, better still, by using a small steel brush. The whole operation takes only a few seconds, and ensures that the full lighting efficiency will be maintained. This cleaning should be done about once a fortnight in fair atmospheres (and should be particularly attended to), but generally the time that should elapse between cleanings must depend on circumstances. When there is much dust in a room, gauze dust-catchers of large area can be adjusted round the air inlet, thus keeping out a large percentage.

In vibration we have, perhaps, our worst enemy. Hundreds of contrivances have been invented and patented for minimizing the effects; but few are of practical utility. Fig. 10 shows the class of fitting which is adopted in my installations for workshop lighting. It will be noticed that the anti-vibrator is formed by a spiral spring with a flexible tube connection allowing the inertia of the whole fitting to be used to protect the mantle; and with this class of anti-vibrator, made in suitable sizes, incandescent gas-mantles can be used in shops where constant running machinery is transmitting vibrations to the whole of the building. This fitting is simple in design, and has an excellent reflecting surface. The globe is released by one trigger; and while the burner is being remantled, the globe can rest on the hook at the bottom of the fitting. The fitting may carry a 150 or 300 candle power burner, and have an ordinary bye-pass, electric lighter, or automatic lighter. There are various forms of fittings suitable for high-pressure lighting; and in many cases existing pendants can be used, as burners can be fitted with galleries and globes. For exterior lighting, I consider it necessary to have all-copper lanterns, riveted, and of ample area.

We are all well aware that there are advantages and many drawbacks with the ordinary pilot-light; and in a country such as ours, where the textile industries form a large portion of the staple trade, there are obvious objections to the pilot-light. Insurance companies refuse premises at the ordinary premium rates when they have this form of lighting-up. The makers of the Keith light have devised a means of electrical ignition which overcomes the drawbacks of the pilot-light and gives all its advantages. The current is provided by a battery of dry cells, assisted by a sparking coil. One pole of the battery is connected to the main gas-pipe, and the other pole to the insulated wire, from which branch wires are led to each fitting. On the fitting, in place of the ordinary cock, a special electric lighting-cock is attached, to which the branch wires are led. The operation of lighting-up is just the same as with the ordinary pilot-light. The tap is turned on, and an electric spark lights a climbing bye-pass, which in turn lights the burner; and on releasing the cock lever, a strong spring turns off the bye-pass, leaving the burner full on. This lighting device has been adopted in many mills, and deserves the attention of all those who are interested in lighting similar premises.

Another lighting-up device, when the pilot-light is no objection, is the automatic mercurial bye-pass. This is particularly suitable for halls and large works, street lighting, &c., as it enables a number of lights to be controlled from one position. With this form the ordinary cock is replaced by a mercurial seal, which is operated by the variations in the gas pressure. Imagine we have a section or the whole of a building the piping of which is charged with gas at ordinary pressure. This keeps the pilot-light burning. To light up the burners is merely the operation of turning on the high-pressure gas supply. This displaces the mercury in the seal, giving a momentary flash-light to the bye-pass, and allows a full supply of gas to flow to the burner, which, of course, is lighted by the pilot-light. Besides the convenience in lighting up by this arrangement, there is also a great saving in time, and I can imagine this form being particularly suitable for buildings where the fittings are suspended a great distance from the floor.

All installations, I would suggest, should be undertaken, if possible, by the gas company. This allows the manager to become thoroughly acquainted with the plant, and he is able to see that everything is being done properly, and that all joints are made tight. The care of the mantles and upkeep should also be in the hands of the gas company. My Company send a man round once every week to replace mantles or clean burners if necessary, at net cost price; and to this I partly attribute the pleasure we have with our installations.

Respecting the cost of high-pressure gas lighting, of course local conditions have a lot to do with this, such as the price of gas, the cost of power, whether it is water driven or otherwise; but, under any circumstances, one should be able to compress gas at a cost not exceeding ¼d. per 1000 cubic feet. In large installations, this item should be considerably reduced. The cost under the heading of maintenance is somewhat similar in all districts. I have kept careful records of all expenses under this heading that have been incurred at the railway companies' works, and, taking the 300-candle power burners, which consume 10 cubic feet of gas per hour, my mantle average for the past year is one mantle per 562½ burning hours. To allow for any possible omissions we will take it as 500 hours. And the cost of producing 1000-candle power for 1000 hours on this basis, with gas at 3s. 9d., as at Dundalk, would equal (say) £6 5s.; mantles, 6⅔ at 6d. each, equal 3s. 4d.; labour, cleaning glass, &c., equals 1s. 2d.—making a total of £6 9s. 6d., or 1·554d. per 1000-candle power per hour. I am not taking the cost of gas at the most favourable price. I think that being able to give in practice an actual candle power of 1000 at the figure mentioned, is a fact that we, as gas managers, should make the very best use of, whether in competition or not with other forms of artificial lighting.

Discussion.

The PRESIDENT (Mr. J. Whimster) said Mr. Airth had read a paper which was of interest to them all. Perhaps some of them might have had experience with the light. He himself had not but if any had, they would be glad to hear whatever remarks they might make, either in the way of comment, or of further experience of high-pressure lighting.

Mr. C. B. OUTON (Inchicore) said he had had experience of one of these machines. They had had the system in use at the Inchicore works during the last two winters. It was driven by means of the main shafting—their water supply not being such as would allow of the uniform pressure which the writer of the paper mentioned as being necessary for the working of the machine. Their main line of shafting might be working at 120 revolutions per minute, and they drove one of the machines with the speed diminished in such a way as to make the strokes about 40 per minute. Two winters ago he erected 16 lamps, each of them containing a cluster of three burners. They consumed 30 cubic feet of gas per hour per lamp. They replaced some 44 single burners, consuming something like 220 cubic feet per hour. The shop to which he referred was the one in which the whole of the shearing, planing, and such-like machines were placed, as well as the fitters' benches; and, accordingly, the lights from the original brackets were the source of a large number of shadows, which interfered with the progress of the

work. He was perfectly certain that by the aid of the increased illumination the efficiency and the output of the work had been enormously increased. He estimated that while the consumption was about double, the general illumination had increased about twelvefold. The general effect, too, had been increased by the whitewashed walls. He found some considerable difficulty at first with the breaking of the mantles. In fact, the mantles in many instances broke while being attached; but recently there had not been so many breakages. In order to avoid the destruction due to vibration by machinery, he carried the service along the higher girders, and interposed some thickness of india-rubber, with the view of reducing or deadening the vibration. He was also troubled with fractures in the lanterns, which were of the ordinary hexagonal type. They frequently showed signs of fracture, due to the intense heat; but this had been overcome by cutting the glass horizontally, half-way down, so that any local increase of temperature produced the necessary give-and-take in the expansion. He had not been able to overcome some fluctuating in the pressure. The gas-main was a 4-inch one, and there was a fair demand upon it; and though he had adopted the usual anti-fluctuator, and had also carried the gas into a larger cylinder, he had not been able to overcome a slight fluctuation in the pressure. Otherwise, he thought the system was one to be highly commended, and was well adapted for factories and workshops.

Mr. J. G. Tooms (Waterford) said he had had a small No. 3 Keith high-pressure installation working in a shop for over two years; and he must admit that his impression now was that he did not think he would put in another, in a similar case. The paper dealt with Keith's system in Dundalk. He was going to speak of high pressure, or high power lighting generally. His own impression and his own experience were that they obtained more satisfaction—in a small installation, at all events—from "Lucas" and also from "Wis" lights. In his opinion, they could derive from the Lucas lamp as much light as from Keith's high-pressure system; and they had no trouble with the pressure-raising or with the compressors. At the same time, he had no fault to find with the small Keith installation which he had. Mr. Airth's mantle account was really very astonishing to him. When he put in his installation, he got Messrs. Keith to supply everything—burners, fittings, and mantles—so that it could not be afterwards said that any defects were due to any work of theirs. They supplied their own special fittings. His mantle account ran to something like one mantle a fortnight. He had four double outside lamps, supposed to give an illumination of 700 candles each. He had since been able to reduce his mantle account by adopting an anti-vibrator ball joint. He forgot its name. By its means he had been able to get a considerably longer life from the mantles. He also had trouble with the compressors. After working for six months satisfactorily, without any apparent reason, they commenced to clog, and the light to diminish. This was due to one of the leathers getting worn—not to any defect in the apparatus. In the shop in which the Keith apparatus was placed, the ceiling was as low as 6 or 8 feet, and the ground floor was used as a store; so that there was a good deal of traffic over it, which might account for the excessive mantle account. He had a Sugg installation, which he thought was, burner for burner, immeasurably superior to the Keith light; but he should mention that it was in a very much better window, and had an opportunity of showing itself off to greater advantage. But when he put in the Sugg light there was no self-intensifying plant except the Scott-Snell. The people who had the Sugg light—and, after all, it was by the consumers' experience in practical lighting that they had to go—said that they would prefer to have either the Lucas or the "Wis" light; and, for his part, he certainly would not recommend any installation of compressed gas at all, but some form of self-intensifying gas lighting.

Mr. T. J. Reid (Ballina) said he had had some experience of the Sugg, Keith, and Lucas systems. With regard to the Sugg system, the circumstances were these: Adjoining his works there was a mill, the owner of which adopted electric lighting, the current being generated by a turbine. This gentleman, being largely endowed with the missionary spirit, immediately began to recommend his fellow-townsmen to follow his example and he put up an arc lamp outside his works. As these were in the next street to the gas-works, he (Mr. Reid) felt that he could not afford to have his light dimmed by his neighbour's; so he erected one of Sugg's high-pressure lamps, with three burners in it, over the entrance gate. He could say without prejudice that this gave a much better light than the arc lamp, though this had the advantage in regard to size. With respect to the Keith and Lucas systems, he agreed with Mr. Tooms that, unless they had works such as Mr. Outon's to light, the Lucas lamp gave them all that was required. At the same time he demurred to the use of all forms of intensified gas lighting; as he considered the ordinary mantle quite sufficient. What was required was uniform lighting by a number of units rather than large units of light. There was no doubt that higher pressure increased the lighting efficiency; and he thought this pointed to the advisability of distributing gas at a greater pressure than had hitherto been done.

Mr. Matt Dunn (Stockton) asked to be permitted to add a few words. He stated that in Stockton-on-Tees they had to compete with electric lighting, and so far this had been done very successfully indeed. The management of this new municipal venture had, from the date of its introduction a few years ago, quite enjoyed perfect freedom of action, and, further, the privilege of saying and doing exactly as it best suited them, for the purpose of obtaining a good list of renters. Needless to say much of this was done at the expense of the Gas Department, and with consequent loss to the town; gas being a profitable undertaking, while the losses on the electricity works averaged about £1000 per annum. The authorities, too, were generously disposed to the young rival; and, as a mark of their favour, they ordered that it should be installed in all the public buildings, halls, offices, and works belonging to the Corporation—discarding, of course, the then existing gas supply. In addition to this, many of the best business premises, offices, workshops, &c., in the town were persuaded to adopt electricity; while the Gas Department, powerlessly, viewed the young stripling divesting it of its best renters, and, like the good indulgent parent, with an experienced smile allowed this to proceed unopposed. It was pleasing to relate, however, that, notwithstanding the introduction of the electrical youngster, and despite the efforts of the innumerable wet nurses who championed its cause, and at all costs safeguarded and nourished it, the gas profits had increased almost 75 per cent., and this with a 10 per cent. reduction in the price; so that in Stockton the effect of electricity supply was of little moment, and was hardly felt at all. Turning to the subject before the meeting, after tremendous pressure, the Corporation permitted the lighting up of their Shambles on the most up-to-date lines; and a Keith and Blackman installation of high-pressure lighting was agreed upon, with a view to making a comparison between the two lights, their relative powers and costs. It was soon discovered that the Shambles—an old-fashioned building with low roof, with 8 feet clear headroom, supported upon numerous short columns—was a most difficult building to light without throwing innumerable shadows. The building measured 108 feet in length by 45 feet in width, amounting to 4860 superficial feet floor area. Thirteen 2-light shadowless "arc" lamps (26 burners in all) were fitted therein at a height of about 7 feet from the ground-line, in substitution of the 68 batswing burners in use at the time. The candle power of the old system might be put down at 1020 candles. As against this, they had 26 lights of 300-candle power each, which was equivalent to 7800 candles. He was quite aware that 7800-candle power over an area of 4860 feet was quite exorbitant, as they were taught that one candle per superficial foot of area was sufficient. But in this particular case, the shallow roof and the columns made it necessary to increase the light, in order to overcome the shadows. This had been very effectively done. Previous to the installation being put in, the annual consumption of gas was 264,000 cubic feet; under the new system it was 145,000 cubic feet. On the old system the value of the gas consumed was £29 14s., with 10s. for maintenance; making £30 4s. On the new system, the value of gas consumed was £16 6s. 3d., and maintenance (which included mantles, rods, and the water to compress the gas) amounted to £2 2s. 1d.; making a total of £18 8s. 4d. The difference in favour of high-pressure lighting was £11 15s. 8d.; and, ignoring the increase of light, represented nearly 40 per cent. It was only fair to look at the matter from the other point of view. There was a difference of 765 per cent. in the candle power, which was tremendous. The candle power per superficial foot of area was now 1·6, as against 0·21 under the old system. If they ran this out into money, the figures would startle them. They would get something like the enormous sum of £89 15s. 7d. of saving, light for light. At no time while the apparatus had been working had they been called to do anything to the installation beyond what was involved in the breaking of a mantle or a rod. The installation was not controlled directly by the Gas Department, although they naturally kept a keen eye on it. As a result of the success of this installation, a laundry company had been floated in Stockton, during the previous few months, and they had adopted the same system of lighting, with like satisfactory results.

Mr. Tooms would like to add his testimony to the fact that the water used by the Keith motors was practically infinitesimal. He put in a motor, in connection with the Sugg installation, and arranged with the Water Engineer that they were to pay, he thought, 10s. a year for water to drive the motor. When he came to put in the Keith installation, the Engineer would not give him water unless by meter. The meter was put in, and for about twelve months it did not register anything.

Mr. Airth, in closing the discussion, said he was very pleased to hear about Mr. Outon's installation. He might say it was not easy trying to put in a water-driven motor under Keith's system with a pressure of less than 20 lbs. This one worked at 18 lbs.; but if the pressure dropped to 17½ lbs. the apparatus stopped. He thought the fluctuation Mr. Outon spoke of was due to his driving his compressor a little too quickly. He was afraid it was not able to stand the 40 strokes per minute. He had experimented with smaller and larger machines; but he was not so well acquainted with those spoken of by Mr. Outon. It seemed to him that the machine was going rather quickly.

Mr. Outon said that in this respect he merely carried out the instructions of the makers.

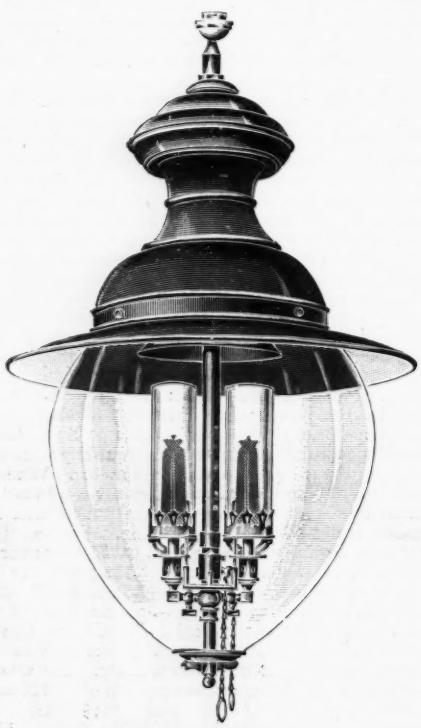
Mr. Airth, continuing, said that in his last installation he had to deviate a little from the instructions of the makers with regard to the mantles breaking at first. He might give them his figures. There were originally 80 burners, using 320 cubic feet of gas; there were now 13 high-pressure lamps, using 150 cubic feet of gas. There was a saving effected in 18 days in the winter of £1 11s., which was 41½ per cent.; and instead of having

a candle power of 1320, they had 3900, according to their claims. Mr. Tooms spoke about the Lucas lamp. He did not like to say anything against any light. He had himself some Lucas's, of which he was extremely proud, and he had one of which he was not proud, but did not know what was wrong with it. It was in a very exposed position; and if he put on a low pressure, the gas struck-back. In their second installation they had a saving of 47¾ per cent. Mr. Reid also spoke about the Lucas lights. It was a matter of £ s. d. If the installation were small enough, they would be justified in putting in self-intensifying lights; but if they got into a large installation, he thought the Keith or some similar light was the more suitable. He merely took up the Keith system because he had had some experience with it, but he did not hold any brief for it. He thanked Mr. Dunn very much for having given them his experience. His own saving ran to 41½ and 47¾ per cent.; so that for about four times the illumination their figures would practically coincide. In his paper he mentioned that the cost of compressing the gas should not exceed ¼d. per 1000 cubic feet, and should be below that in the case of large installations. Owing to his installations being driven by hot-air motors, he might tell them that the cost was considerably more than ¼d.; but in a large installation he was putting in at the present time, he hoped to be able to do it a little cheaper by a gas-engine. He begged to thank them for the manner in which they had received his paper.

Mr. Tooms proposed a hearty vote of thanks to Mr. Airth for his paper. Having had the secretaryship for twelve months, he might say it was extremely difficult to get anyone to read a paper this year; and it was only in view of not having any paper at all that Mr. Airth timidly allowed him to put him down for one. So that they would see that his proposing a vote of thanks to the author was not merely matter of form.

LARGE OUTDOOR INCANDESCENT LAMPS.

Large lamps for incandescent lighting, such as are suitable for shops, works' lighting, railway stations, docks, and so on, have been receiving much attention of late from makers. Among them are Messrs. Falk, Stadelmann, and Co., of Farringdon Road, who are entering with confidence into the competition with their "Improved Veritas" and "Veritas-Celestra" lamps, which are wind, rain, and dust proof, and made for two, three, or four burners according to the amount of illumination required. Lighting power in large lamps exposed to all conditions of



weather is not, experience has made clear, the only thing to be considered; and manufacturers have, each new lamp brought before us shows, been exercising themselves to secure some additional advantage in point of durability. The casings of the two series of lamps now under notice are built of strong steel; and one of the improvements is that no fixing screws or fittings are used on the exposed part of the lamp. An old trouble with large lamps of similar class was that the interiors were fixed by putting screws right through the casings, with the result that the enamel became chipped at these points; and there was the seat formed for rust and eventual breaking away. This has been obviated by having the whole of the lamp held together on the inside.

Another point is the new fixing arrangement for the globe. Instead of this being supported by screws from the top of the lamp, there is an extension from the central tube below the burner, and through this is passed a moveable slotted carrying arm. In the slots the globe, or the frame in which it is seated, rests. When the globe is to be lowered, it is slightly raised; and the arm can then be displaced—thus permitting the globe to descend. The globes are made with narrow openings or large ones—sufficiently large, in fact, for the cleaning of the globe inside without removing it. In both forms, the globe is fitted at the base with a hinged, self-locking fitting supporting a glass cup or bowl, or, if preferred, a tapered globe can be used. The chimney above the mantle is cone-shaped; and one effect of this is to concentrate the products of combustion, and carry them right away to the top of the lamp. The lamps are provided with a domed 24-inch reflector, inside which, and surrounding the lamp, are the air-inlets. The cone-shaped chimney coming below the air-admission holes has the effect of preventing the cold air descending immediately on to the mantles, but deflects the current outwards towards the glass, and so heats it up before it reaches the burners.

It has already been mentioned that these lamps are made for cluster lighting; and any burner can be used in them. But Messrs. Falk, Stadelmann, and Co. have naturally a preference for their own "Celestra" burners. These are made in two sizes—one consuming 3½ cubic feet, at 14-10ths pressure, giving a light of 65-candle power; and the other, consuming 4½ cubic feet, giving a light of 75 candles. Multiplying these consumptions and the powers by the number of burners used, and the approximate figures are found for any cluster. The new lamps are fitted with tap, lever, and chains inside the lamp, but, if required, the cock and lever and chains can be fixed on the supply-pipe above the lamp. The lamps can be had enamelled in any plain colours, or gold embellished. The lamps are strongly constructed, and have a decidedly superior appearance.

TESTING COMMERCIAL BENZENE.

The use of benzene for carburetting gas is attended with the risk of adding to the sulphur compounds, if the liquid is not sufficiently well purified. The sulphur-containing ingredient of crude benzol is mainly carbon bisulphide, which by careful fractional distillation may be largely removed. Another ingredient—viz., thiophene (C_4H_4S)—is not so easily removed, inasmuch as its boiling-point is approximately the same as that of benzene, and the homologues of the two substances have approximately equal boiling-points. Frequently, 0·6 per cent. of thiophene is present in commercial benzene, and may be separated by shaking with about 10 per cent. of strong sulphuric acid, which converts the thiophene into a sulphonic acid. The thiophene passes over when the sulphonic acid is distilled with steam, appearing as a colourless body, a liquid of sp. gr. 1·06. It boils at 84°C., and when mixed with isatine ($C_8H_5NO_2$) and strong sulphuric acid, yields a blue colour. This reaction, due to the formation of indophenin ($C_{13}H_7NOS$), serves to detect thiophene or its homologues in benzene.

Carl Schwalbe ("Berichte," Vol. XXXVII., 1904) has found several samples of commercial "pure" benzene which were known to contain thiophene that failed to respond to Liebermann's test—giving a dirty brown instead of the dark blue coloration. Formerly all samples of benzene prepared from the coal tar of gas-works responded to the test; but he believed it is probable that the modern German methods of obtaining benzene as one of the products of coke manufacture gives rise to a new impurity which masks the reaction. Liebermann's reaction mentioned by Schwalbe is the production of a blue coloration with concentrated sulphuric acid containing nitrous acid (nitroso-sulphuric acid). C. Liebermann and B. Pleus have investigated the apparent anomaly mentioned by Schwalbe, and find that the explanation lies in the fact that the samples of benzene referred to contain very little thiophene, and that the isatine reaction before mentioned is much more delicate than that with nitroso-sulphuric acid. They also find (contrary to the statement of Bauer) that the indophenin reaction is given by pure sulphuric acid, free from nitrous or nitric compounds. L. Storch has shown that the effect of oxidizing agents in promoting the indophenin reaction for thiophene—viz., blue coloration with isatine and pure sulphuric acid—seems to be solely due to the heat developed. The same effect is produced by adding water, which, of course, generates heat in contact with sulphuric acid, or by simply warming the mixture without the addition of water.

According to Herr C. Reichard, in the "Chemiker Zeitung," blue litmus, when immersed in aqueous solutions of ammonium chloride varying from 1 to 10 per cent., did not turn red, but when it was subsequently exposed to the atmosphere reddening took place. A similar observation was made with solutions of ammonium bromide and ammonium oxalate respectively.

GERMAN NOVELTIES IN RETORT-SETTINGS.

The following is a digest of a communication by Herr D. Pflücke, of Dresden, on some constructions in respect of retort-settings which he describes as novel.

With a view to utilizing most advantageously the space available for the regenerator, or to obtain the largest possible heating surface in its passages, the construction shown in fig. 1 has been devised by the author. Its chief distinguishing feature is that the slabs which form the roofs of the flues contain hollow spaces, which consist of long and narrow passages that connect the air-passages one with another. These slabs are shown at H, fig. 2. The roofs of the air passages consist of partition-walls built up of shaped slabs, through which the fresh air entering at I is forced to spread out over the whole length of the air-passage on one side of the partition-wall, and to pass over into the passage on the other side through the slit-like openings N. The fresh air required by the setting enters at both sides of the regenerator into the lowest air-passage, traverses the whole length of one half, passes to the openings N, and thus acquires heat through the horizontal base plate of the overlying flue-passage. The air flows through the openings N into the slit-like passages, and in traversing them takes up the heat passing through the vertical sides of the slabs H. The air then reaches the air-passage lying next above, through I, and heat is given up to it through the roof-plates from the flue-passages situated above and below it. The same course of things is repeated through the whole height of the regenerator, till the air finally issues from the last passage most intensely pre-heated, and then goes to combine with the producer gas. The air supply is heated not only by the transfer of heat through the horizontal walls, but this communication of heat is largely augmented and the heating effect much increased in consequence of the vertical lateral walls of the slabs H, and the distribution of the air particles affected by the slit-like passages. Crossing of air-passages and flues is also avoided; and this facilitates the cleansing of the flues when necessary. This construction has been adapted to three different regenerative settings, as well as to semi-producer settings. One regenerative setting of eight retorts so equipped has been in continuous use since Sept. 17, 1902.

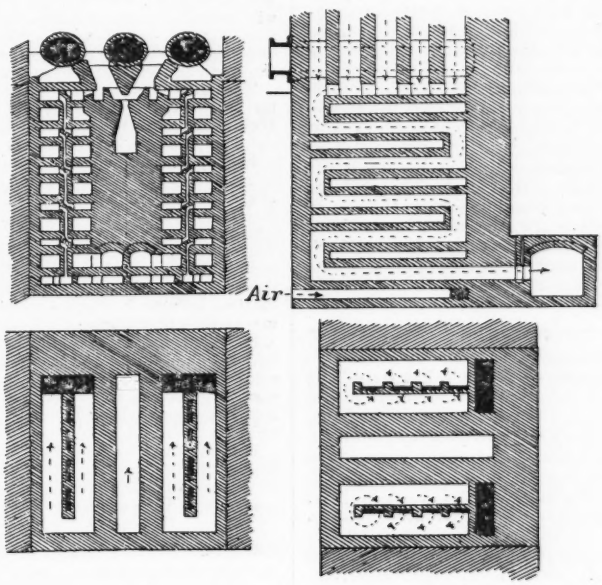


FIG. 1.

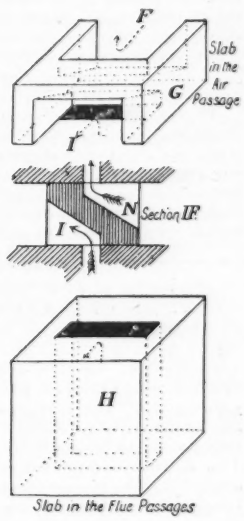


FIG. 2.

The working of semi-producer and direct-fired settings is always attended by a relatively large loss of heat, which is to be attributed mainly to the heat carried away by the furnace gases, and the cooling of the furnace during clinkering. Pre-heating of the air supply diminishes appreciably the first source of loss; but the importance of the second source appears to have been underrated, and arrangements for reducing its effects have not been commonly adopted. The cooling is due, in the first place, to the fact that during clinkering the door of the furnace must be open, and cold air then streams through the setting unchecked as long as the damper on the exit flue remains open; and, in the second place, air enters at the upper air-inlet and, for lack of fuel, streams through the setting unused. Both sources of loss can be met by the means shown in figs. 3 and 4. The cold air which enters the furnace-chamber must be prevented from passing farther into the setting; and this object may be accomplished by drawing forward, when clinkering is started, a fire-clay plate B, which turns on its seat S at the back of the furnace-chamber. The exit for the furnace gases is thus closed, and is opened again when the clinkering is finished. The inflow of cold air through the open furnace door can be avoided by operating the dampers I and H through the rotating bolts F G of the crank G M and the lever M T. This arrangement works automatically with the opening and closing of the furnace-door N, which is connected with the bolts F G.

It is an advantage in small gas-works, where settings of only two, three, or even four, retorts are used, to bring together two such settings under one arch, so that when the necessity for increasing the make of gas arises later, there will already exist an adequate arch for a setting of several retorts. In order to avoid the want of soundness which arises when the partition-wall of the two settings abuts on the crown of the arch, the author conceived the plan of making the partition-wall as shown in B C D (fig. 5), with the two limbs C and D diverging and forming the channel A, which is accessible while the settings are in action. It is thus possible to repair and close cracks which develop in the course of working, as such cracks usually are about the spot where the partition-wall meets the arch. All the arrangements described have been patented in Germany.

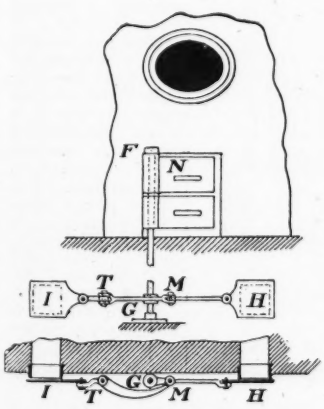


FIG. 3.

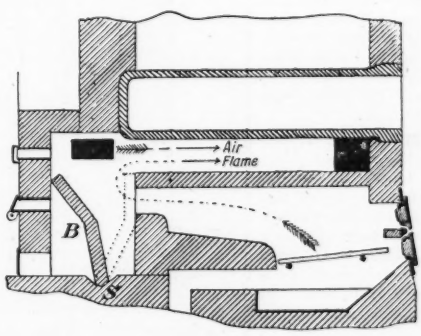


FIG. 4.

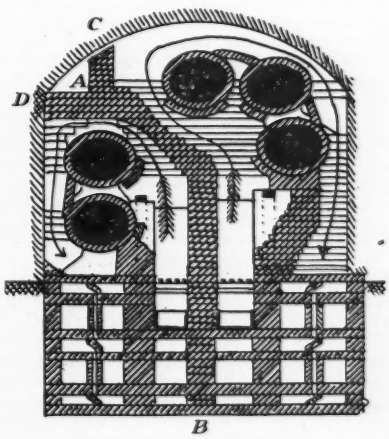


FIG. 5.

Pyridine Bases.—The German Government are reported to be seriously considering the question of reducing the quantity of pyridine bases for denaturing purposes from 2½ to 1¼ per cent.; and seeing that Germany consumes about 70 per cent. of the English production, this information, if it eventually turns out to be correct, will be of interest to many "JOURNAL" readers.

TEMPERATURE IN GAS MANUFACTURE.

A recent issue of "L'Eclairage" contained remarks—some partially reproduced from the "Moniteur Industriel"—on the subject of the effect of temperature in the manufacture of gas Our contemporary reminds its readers that the gas manufacturer should attach the greatest importance to the temperature in the distillation of coal, as it affects both the yield and the quality of the products given off. The temperature to which the retort must be heated is usually estimated at 1800° Fahr. It is, however, evident that this high heat is not necessary in order to liberate the gas from the coal; whereas during the first hour of distillation the temperature of the interior of the retort and that of the coal itself will be far below this. As a matter of fact, it is usually considered that the emission of gas commences at 1000° Fahr., and if each particle of coal could be at once exposed to this temperature, and not to a higher one, it is probable that the best gaseous products would be obtained. But between 1000° and the ultimate temperature of 1800° which the retort attains, what happens as the result of decomposition and recombination? For in proportion as the charge in the retort is gradually raised from the atmospheric temperature to 1800° Fahr., the complex molecule of coal is submitted to different degrees of disintegration, yielding ever-decreasing products, until there remain only some hydrogen gas and carbon deposited upon the sides of the retort. The problem which the gas manufacturer has to solve, therefore, is to arrange matters so that the valuable products are obtained between these two extremes. Our contemporary concludes by remarking that, as has been known for some time, in the process of gas manufacture, the gaseous products of distillation should be expelled from the retort as quickly as possible.

Promotion of Joint-Stock Companies Last Year.—According to a return lately issued by the Board of Trade, there were 4002 companies registered in London, Edinburgh, and Dublin in the twelve months ending Dec. 31, 1903; the nominal capital being £126,606,015. Of this sum, £13,259,385 was paid up; and the amount considered as paid on vendors' and other shares was £36,275,463. The companies which were registered in England, and which filed a prospectus, had a nominal capital of £20,553,865; the amount in Scotland being £3,458,000, and in Ireland £81,500. The English companies offered for subscription in cash capital amounting to £9,989,173; the Scotch companies, £1,063,287; and the Irish companies, £40,610. A total of 367 registered companies received certificates to commence business; while 88 which had been registered did not receive any. The total number of companies on the register on April 30 this year was 37,287, with a paid-up share capital of £1,899,648,675. Ten years previously, the number was 8692, with a paid-up capital of £475,551,294. The statistics show that the annual increase in 1903 and 1904 was not so great as in preceding years.

Supply of Bye-Product Gas at Duluth (Minn.).—According to a statement made by Mr. Dwight E. Woodbridge in a recent number of the "Engineering and Mining Journal," the American Coke and Gas Construction Company have put up a 50-oven Otto-Hoffman coking plant for the Zenith Furnace Company of Duluth (Minn.) The coke is used by a 250-ton iron blast-furnace, and the capacity of the ovens is about 350 tons of coke daily. The furnace began operations in August. The battery is of concrete and masonry, 36 feet wide, 200 feet long and 40 feet high, with ovens 17 inches wide, 33 feet long and 7 feet high. The tar and ammonia pass to a fireproof building where they are recovered; the tar being extracted by a novel screen device before it reaches the extractors. About 10 million cubic feet of gas will be furnished for municipal use to the cities of Duluth and Superior. It is stated that Duluth is offering gas to consumers at from 75 c. to 90 c. per 1000 cubic feet, though they get it at a considerably lower figure. The Zenith Furnace Company agree to fix even lower rates for house heating up to Dec. 15, and after March 15 next year to furnish burners for house furnaces. By selling the gas they hope to lessen the cost of producing pig iron.

Alloys of Rare Earths for Ignition and Lighting.—According to Dr. Carl Auer von Welsbach, as recorded in the current issue of the "Revue des Produits Chimiques," small fragments of the rare earths do not ignite spontaneously in the air under the influence of friction with a hard or sharp substance, though previous experimenters have asserted this to be a fact. On the contrary, he says, the absence of spontaneous ignition is in some cases a proof of the purity of the metal. However, when the rare earths are alloyed with other metals, especially iron, they do ignite spontaneously in the above-mentioned circumstances; the production of sparks increasing with the percentage of iron in the alloy. The light thus produced is very brilliant. The maximum is obtained with 30 per cent. of iron; the alloy being so sensitive that it emits sparks when hardly touched with a file, though the light-giving power is not so great as before. These alloys, especially with a high percentage of iron, are harder, more brittle, and more resisting to air than the pure rare earths. Lanthanum alloys produce the most brilliant light; cerium the least. Iron may be partially replaced by nickel or cobalt; if entirely so, the alloy is less pyrophonic. Moreover, combustible gases can be ignited instantaneously by means of chips detached by friction.

REGISTER OF PATENTS.

Treating Tar for the Elimination of Water.—Oppenheimer, W., and Kent, T. O., of Queen Victoria Street, E.C. No. 12,696; June 5, 1903.

This process for eliminating water from water-gas tar, consists in mixing with it such an amount of a calcium salt as will chemically combine with the water, then allowing the chemical compound thus formed to settle, and subsequently drawing off the dehydrated tar from the settlement.

The patentees remark that two calcium salts—calcium oxide (CaO) and calcium sulphate ($CaSo_4$)—have the peculiar property of chemically combining with water to form new chemical compounds. Thus, calcium oxide and water form calcium hydrate (slaked lime), according to the equation: $CaO + H_2O = Ca\,2\,HO$. Again, calcium sulphate will assimilate two molecules of water and form a hard crystalline mass, thus—$CaSO_4 + 2\,H_2O = CaSO_4, 2\,H_2O$. Advantage is taken of these facts, and of the fact that the tar contains little (if any) acid, to secure the elimination of water from water-gas tar.

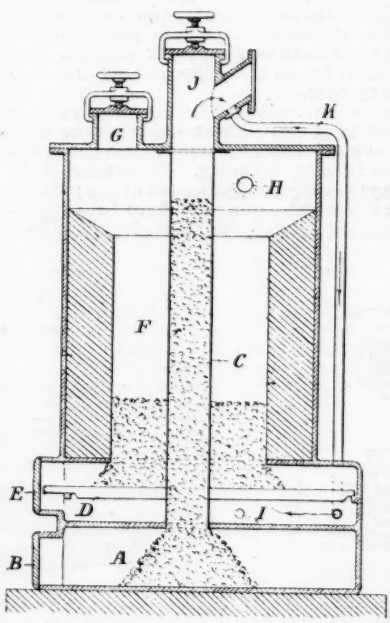
The proposal is to take, in the first place, an average sample of the tar and carefully estimate it for the percentage of water it contains; then work out by the chemical formula the amount of calcium oxide or calcium sulphate (whichever is used) that is necessary to enter into chemical combination with the water. Having added and mixed it, it is allowed to stand; then having drawn off the dehydrated tar from the chemical compound formed (calcium hydrate or crystalline calcium sulphate), the tar is placed in a still and distilled for the purpose of separating and recovering the pitch and the more volatile products. The slaked lime, if this be the residual chemical, can then be placed in a suitable kiln; and any volatile products it may have eliminated or absorbed from the tar during the process may be recovered. The calcium hydrate, being once more reduced to calcium oxide by roasting, can be used over again.

In some cases, the amount of water present in the tar is very large; and before treating the tar as mentioned, a certain amount of some soluble salt—such as chloride of sodium—is added, which increases the specific gravity of the water to such an extent that a large amount of it can be separated mechanically. Then the tar is treated with calcium salts, as described.

It is said that by this process water-gas tar is made to yield a more brilliant pitch than has hitherto been recovered, and of finer quality; while the valuable more-volatile constituents are recovered, instead of being allowed to escape.

Producing Poor Gas Free from Tarry Matters.—Boutillier, L., of Paris. No. 16,763; July 29, 1904. Date claimed under International Convention, Aug. 25, 1903.

Patent No. 7979 of 1904 (same inventor) had for its object to produce poor gas free from tar, by employing any combustible generally utilized in furnaces—the apparatus being characterized by the circumstance that it allowed of the distillation of the volatile substances contained in the combustibles to be effected before charging the combustibles into the furnace; the volatile hydrocarbons given off in the distillation being utilized in this same furnace for assisting in the production of the poor gas. The present application has for its object certain improvements in the arrangement of the apparatus, with the object, more particularly, of facilitating the conveyance under the grate of the volatile hydrocarbons arising from the distillation.



The producer-still comprises a metallic casing provided with a bottom beneath which a vacant space A is formed (closed by a door B) of sufficient height to allow of a certain quantity of combustible distilled in the vertical retort C to accumulate. The furnace proper comprises a grate D, a door E for discharging the ashes, and a cylindrical chamber F surrounded with a fire-resisting coating. It also comprises an upper charging hopper G, a pipe H for discharging the poor gas produced, and a pipe I for introducing into the furnace a mixture of air and steam.

The vertical distillation retort C extends through the entire height of the casing of the producer, in order to discharge beneath the grate D into the lower chamber A; and it is provided at its upper part with a hopper J for the introduction of the combustible to be distilled. In the description of the 1903 patent, this retort had, a little below the grate D, a ring of holes by which the volatile hydrocarbons, as given off, escaped. In certain cases, however, it is found very advantageous to

facilitate the escape of these hydrocarbons, which can with the former arrangement only escape from the retort after having attained therein a sufficient pressure to overcome the resistance opposed to their circulation by the combustible accumulated in the retort, and which more or less completely obstruct the ring of orifices for the discharge of the hydrocarbons.

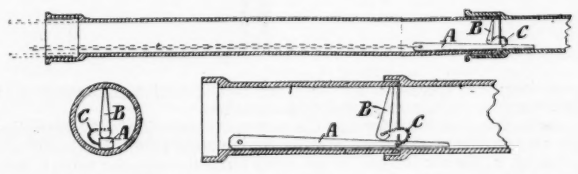
For this purpose, the upper part of the retort C is provided with a nozzle pipe situated externally to the furnace, and from which there branches a pipe K, which descends vertically along the gas-producer and penetrates into the lower part of the furnace at a suitable level for discharging a little below the grate. By this arrangement, the volatile hydrocarbons given off in the retort always have a free exit by the pipe K, through which they are drawn by the suction which is produced under the grate.

After having followed the course indicated by the arrows, they are discharged under the grate, mix with the air and steam arriving by the pipe I, and then pass through the layer of incandescent combustible covering the grate, which completely decomposes them before their entrance into the vessel F, where they assist in the production of poor gas free from tar.

Laying Gas and Water Mains, &c.—Hayes, R. T., of Acton. No. 19,341; Sept. 8, 1903.

The patentee claims that, by the use of his apparatus, lengths of pipe are immediately got into a correct position for fixing, and are so maintained while the joint is being made and a true invert obtained.

Two pieces A B of hard material are flexibly jointed together by a cord or chain C. The pieces vary in size according to the length and depth of the pipes in use. The longer of the pieces—the horizontal piece A—is wedge-shaped and adapted to be placed within, and lie along the bottom of, the pipe; a portion projecting beyond the male end of it. The other piece B, which has its lower end rounded, is



placed vertically within the pipe, and acts as a wedge between the top of the pipe and the horizontal piece—thus holding it rigidly in position.

The male end of the length of pipe is then placed into the female end of the preceding length; the projecting portion of the horizontal piece engaging with the bottom, so as to maintain the two lengths of pipe in the correct position while the joint is being made and caulked. The apparatus is withdrawn from the pipe after the joint has been completed by knocking or otherwise disengaging the vertical piece from its wedging position, and in a long length of piping by pulling the chain or cord attached to it.

Generating Water Gas from Small and Dust Coal.—Wesselsky, L., of Dresden. No, 19,220; Sept. 7, 1903.

The object of the patentee is to render the use possible in water-gas generators of dust coal or very small nuts, which hitherto could not be employed, "owing to the coal forming a compact mass, which, by its pressure, prevented its thorough burning, and in consequence only a small proportion of the fuel used was turned into gas." In the present apparatus, the pressure on the grate is reduced to such a degree as to allow of the use of small nuts and coal dust.

The arrangement for this purpose, shown in fig. 1, consists of a floor which separates the greater portion of the mass of coal in the shoot

Fig. 1.

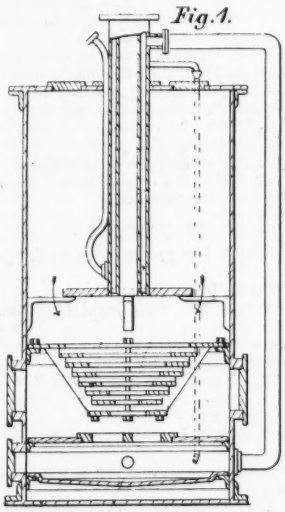
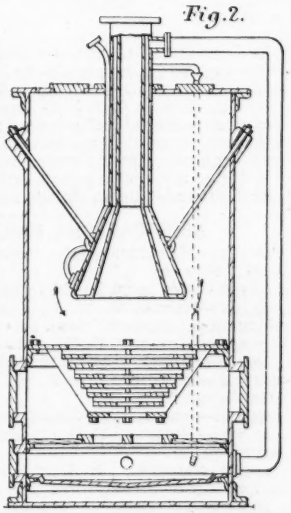


Fig. 2.



from the coal which is being burnt on the grate, and serves as a support to the former (the greater) portion. Hand in hand with this floor works the top ring of the circular and step-shaped grate, which ring serves to support the part of the mass of coal not supported by the upper floor. Thus the grate can work free from pressure. It feeds itself automatically as the coal falls by its own weight into the hollows formed by the coal being reduced to ashes, and does not require to be aided by mechanical means.

Fig. 2 shows an arrangement by means of which the coal is shot on to a conically-shaped body, which, by reason of its being wider at the bottom and its position in the generator, serves the same purpose as the separating floor of fig. 1.

Fig. 3.

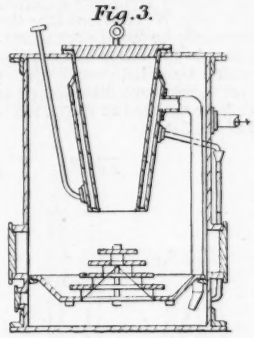


Fig. 3 shows an opposite arrangement to fig. 2. Here the funnel-shaped coal reservoir and the top disc of the circular and conical step-grate serve as supports to the coal mass. By this arrangement, only so much coal can fall on to the grate as fills the places formed by the coal burnt to ashes. The coal falls upon the tapered grate; the latter remains free from pressure; and the process of burning and gasifying proceeds as required.

The parts of the generator shown in fig. 2 can be used both to collect and draw off the gas and at the same time to generate the steam necessary for the production of hydrogen. The idea to use a circular and stepped form of grate instead of the usual flat one is to give the largest burning surface in the smallest space in the horizontal plane, and also to render possible the automatic sideway feeding of the grate. The stepped grate need not be necessarily circular; it may be of a nearly circular or even of square form.

Rotary Pumps, Blowers, and the Like.—Hofe, L. von, of Lüdenscheid, Germany. No. 13,074; June 9, 1904.

This invention relates to a valveless rotary pump, blower, or the like, with surface joints and with blades rotating about a fixed core, characterized by the centre of a hollow distributing (piston having the same direction of rotation as the blades) being arranged between the outer circumference of the fixed core and the outer circle described by the blades and by the operative blades, successively penetrating with their inner edges into the hollow piston, and during the rotation of the piston and blades being completely encircled or enclosed by the latter.

Increasing the Intensity of the Incandescent Gas-Light.—Lake, H. H.; a communication from the Gesellschaft für Flüssige Gase Raoul Pictet and Co., Berlin. No. 20,556; Sept. 24, 1903.

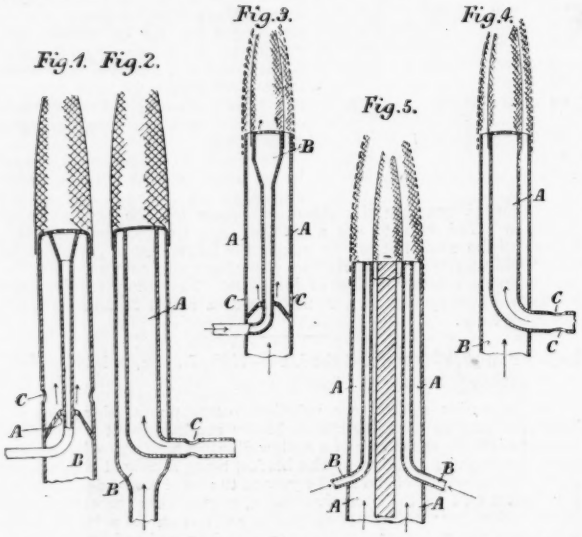
The object of this invention is to permit of the practical utilization of Stephan-Boltzmann's "Law of Radiation" in connection with the increase of the light emission, by heating a body to a far greater extent that has hitherto been effected technically. As is known, the patentees say, the total radiation of a heated body increases in a measure lying between the fourth and fifth power of the absolute temperature of the incandescent body. On the other hand, the practical experiments and theoretical calculations of Kurlbaum, Wien, Pringsheim, Lummer, and others, show that the displacement of the radiation energy maximum towards the blue side of the spectrum takes place rapidly; so that the visible radiation actually takes place, on an average, to the twelfth power of the absolute temperature.

By means of this invention, it is said to be possible to bring a body which is *per se* an illuminant body—such, for example, as nets or rods of the rare metallic alkaline earths—into the hottest zone of a flame which is of itself extremely hot, and thereby heat them in such a manner that the light emitted is far greater than it is possible to attain by other means. "Although it is not possible, for obvious reasons, to obtain in practice results equal to theoretical calculations, under certain conditions a luminous efficiency is obtained which approximates fairly closely the theoretical efficiency."

The process may be carried into practice in various ways: 1. The first method consists in conducting within an incandescing body combustible gas rendered non-luminous by a bunsen burner or other means, while oxygen, or air rich in oxygen, is led externally over the incandescing body. 2. In accordance with the second method, the air or the oxygen is conducted within the incandescing body while the combustible gas is led over it. 3. In a third method, which constitutes a combination of the first two, the air or oxygen is conducted by means of a concentric slit in such a manner that the oxygen flows in between two atmospheres of gas so that an extremely intimate mixture of the oxygen and the gas takes place outside the burner. 4. A fourth method consists in passing a second mantle over the first—gas being conducted within the inner mantle and oxygen into the space between the two mantles. 5. A fifth method consists in admitting oxygen within the inner incandescing body and combustible gas into the spaces between the two incandescing bodies. 6. A sixth method (a still further extension of the process) is based upon the provision in method No. 5 of an additional atmosphere of oxygen through suitable tube slots or holes, whereby the outer mantle is caused to fulfil the same function as the incandescing body in method No. 1, by which means the two superposed bright illuminating nets are obtained. Notwithstanding the fact that, in accordance with Kirchhoff's and Bunsen's laws, a portion of the radiation of the inner incandescent body is absorbed by the mass of the outer body, the interstices of the outer net still permit of the passage of so much light that increased illuminating power is obtained. It is, however, possible to so select the composition of the incandescing bodies (having regard to the fundamental physical law named) that they emit different light—that is to say, light of a different wave-length—so that by selecting totally different elements, the whole of the radiant energy may be permitted to escape.

The essential feature of the novel method consists (in addition to the construction of the burner illustrated) more particularly in the fact that

"these same arrangements result in an almost constant contact of oxygen or air upon one wall of an incandescent body and combustible gas on the other wall." Further, the construction of the gas-supply passages is such that they permit of the issue of the gases under pressure in concentric superposed cylinders. If two gases differing from each other to such an extent, and coming from two different sides, meet on the wall of an incandescent body, it is obvious that the hottest point of the flame formed will necessarily be found at the meeting point. On the other hand, the fact that in the other burners (for example) a cylinder of oxygen is surrounded by a hollow cylinder of gas—both of which flow to meet each other in the same direction or at an acute angle—causes an incandescent body situated in the contact-surface to likewise be in the hottest part of the flame.



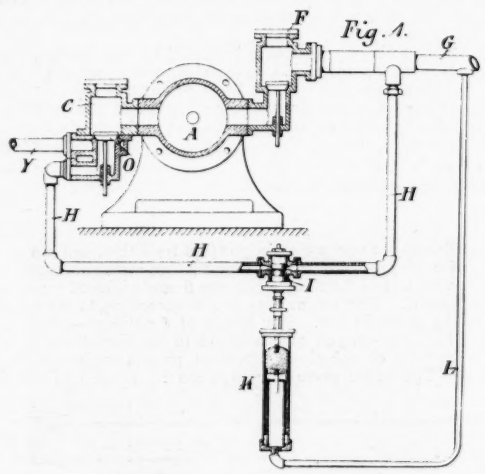
The process also differs from burners in which air and gas mingle together in a tube, owing to the fact that here (as already stated) the gases issue separately. The burners are, however, also different from the usual oxy-hydrogen burners to the extent that the multiplication of the blast action is attained by the cylindrical gas outlet tubes with the assistance of a very simple device. A further characteristic feature consists in the fact that the pressure under which each of the gases issues from the tubes of the burner is so regulated that contact of the gases will be very restricted; and contact will only take place at the openings in the mantle. In this way, each opening acts as a gas-blast aperture, through which the gases are sucked, and diffusion of the gases into each other will be almost completely avoided. A further effect will be that the edges of the small openings will withstand the highest possible temperature of the flame, because the flame will act only to a limited extent on the edges. The novelty of the process also resides in the fact that, contrary to what is the case with previous inventions—in which reliance is placed upon the capacity for suction of the flame (which is extremely defective)—the oxygen required to support combustion and for producing the highest temperature is introduced in a conduit and under pressure at the place at which it produces the greatest effect.

As already stated, the combustible gas is employed in a non-luminous condition; and it is immaterial whether this is attained by mixing the gas with air in a bunsen tube or whether oxygen alone is forced under pressure into the mixing-tube, in which latter case Davy gauzes for preventing the flame from lighting-back must be employed. It is unimportant whether the gauzes are suspended above the burners or extend within them.

Various constructional forms of burner for carrying the invention into practice are illustrated. A is the gas-conduit; B the oxygen conduit; and C the air-supply openings for a bunsen burner. In figs. 1 and 2, the burners are provided with a single incandescent mantle; while in figs. 3, 4, and 5 similar arrangements are shown with two incandescent mantles. The single or double mantles can, however, be used with either form. The mantle may be placed with its lower edge above the burners or within the interior of the burner. In the arrangement illustrated in fig. 5, a gauze of refractory oxide is arranged over a burner; a second tube being concentrically arranged in the mixing-tube. From this tube flows (through an annular slot or through fine openings or a fine gauze) industrial oxygen or compressed air.

Producing Mixtures of Gas and Air.—Aktiengesellschaft für Selas-Beleuchtung, of Berlin. No. 16,288; July 22, 1904. Date claimed under International Convention, Oct. 21, 1903.

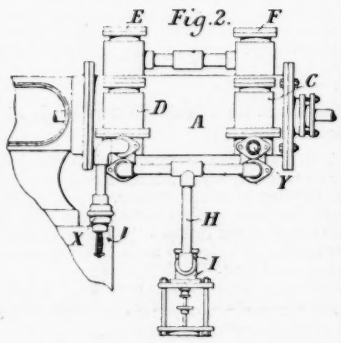
In patent No. 17,788 of 1903 is described an apparatus for the production of a mixture of gas and air, more particularly designed for illuminating purposes, with the employment of separate suction and forcing chambers for the gas and air respectively, in which, when the consumption of the gas and air mixture fluctuates in such a manner that excess pressure arises in the service-pipe, at each operation of the suction and forcing apparatus, the quantities of gas and air sucked in are replaced (either partially or wholly) by gas and air mixture which is at the same time drawn from the service-pipe through back-suction or circulation conduits. The devices to be employed consist of valves, which are adjusted in accordance with the pressure in the service-pipe and alter the cross-section of the passage of the return conduits. But, say the patentees, experience has demonstrated that these back-suction or return conduits operate more efficiently and more certainly, and, further, that the efficiency of the machine as a whole may be increased, if the return conduits are provided with special suction valves in such a manner that, upon each suction operation, the two inlets for gas or air on the one hand and for gas and air mixture on the other hand, are opened, but are closed during the forcing operation. In the apparatus described in the 1903 patent, no obturation of the return conduits takes place during the forcing operation; so that this is also used partially for the return. By this means, however, the device altering the cross-section of the back-suction conduits is prejudicially effected. But, in accordance with the present invention, the whole of the amounts to be forced are supplied by means of the pressure valves only.



A form of apparatus for carrying this invention into practice is illustrated in cross section and side elevation.

Assuming that a suction and force pump A is provided which supplies air on one side of the piston and gas on the other side. In accordance with fig. 2, the suction of the gas takes place through the valve C and the air through the valve D. The gas flows through the conduit Y, while the air is sucked through the conduit X. The valves C and D are arranged symmetrically.

Further constructional details of the valves are shown in fig. 1, in which the valve C is represented in section. In this figure also is illustrated the construction of one of the two pressure valves E and F, through which gas and air, and also the mixture of gas and air which is sucked back, are supplied to the service-pipe G. The pipe is in communication (in the manner described in the former patent) with the governor K by the intermediary of the conduit L; and the valve I, for the passage of the gas, which is mounted in the back-suction conduit H, is positively connected with the governor. In the example here illustrated, two conduits branch off from the back-suction conduit H behind the flow regulator I (fig. 2), one leading to the gas suction valve C and the other to the air-suction valve D.



As shown in fig. 1, the same obturating member O serves both for obturating the gas-supply pipe and also for obturating the back-suction conduit. Accordingly, at each suction operation by the lift of the obturating member O both the gas-suction conduit and the back-suction conduit are simultaneously opened; and, *vice versa*, during the supply or forcing phase, they are maintained closed by the pressure in the work chamber. In this arrangement, the back-suction conduits act only during the suction period, and not during the forcing period also, whereby the advantages already mentioned are obtained.

APPLICATIONS FOR LETTERS PATENT.

20,125.—Hawliczek, J. L., "Recovery of bye-products from coking-ovens," Sept. 19.

20,176.—Moeller, J., "Street-lanterns," Sept. 19.

20,191.—Olsen, O. M. J., and Gates, W., "Extinguishing and relighting gas-burners," Sept. 19.

20,220.—Hepburn, H. W., "Lamps," Sept. 20.

20,296.—Milne, J. H., "Incandescent lamps," Sept. 20.

20,348.—Benson, W. A. S. and Co., Ltd., and Andrews, F. A., "Gas-lamps," Sept. 21.

20,364.—Rerup, L., "Gas-cocks," Sept. 21.

20,371.—Rincker, F. G. C., and Wolter, L., "Production of oil gas," Sept. 21.

20,376.—Morrell, R. L., "Admixture of hydrocarbon vapour and air for incandescent lighting," Sept. 21.

20,446.—Thwaite, A. H., and Ward, M. W., "Gas-engines," Sept. 22.

20,517.—Weinrich, A. & C., "Floating burner," Sept. 23.

20,518.—Stolze, F., and Ludloff, F., "Gas-saving valve," Sept. 23.

20,587.—Bray, J. W., "Lamp-torches," Sept. 24.

20,588.—Bray, J. W., "Incandescent burners," Sept. 24.

20,600.—Snell, F. A., "Incandescent lighting," Sept. 24.

CORRESPONDENCE.

[We are not responsible for opinions expressed by Correspondents.]

The Telescopic Coke-Discharging Ram.

SIR,—We note on p. 889 of the last issue of the "JOURNAL" a description of a telescopic ram for pushing coke out of retorts, by Mr. John West. We beg to point out that this machine is, in all essential features, the same as M. De Brouwer's patent coke-discharging machine, as made by us in England. The De Brouwer machine was working in Bruges before June, 1903, and we had a telescopic machine, almost exactly the same as that patented by Mr. West, in operation in England before Mr. West's application was made. Any machine made under this specification will be an infringement of the patent which we are working in England.

Retford, Sept. 30, 1904. W. J. JENKINS AND CO., LIMITED.

SIR,—In view of correspondence on this subject, I beg to point out that I obtained provisional protection for my new discharging invention on the 26th of March of this year; and this was prior to the first publication of M. De Brouwer's patent.

I notice it is stated that my patent "telescopic" ram for pushing coke out of retorts is in all its "essential" features the same as M. De Brouwer's patent, and is an infringement of his patent. One of the "essential" features of my patent is the combination of the chain and telescopic ram, which (I wish particularly to point out) is nowhere shown, mentioned, or claimed in the course of M. De Brouwer's patent, No. 14,089.

If Messrs. W. J. Jenkins and Co., Limited, had a machine with a combination of chain and telescopic ram similar to mine in public operation before my application was made, then my patent is void; but Messrs. Jenkins and Co. cannot claim this combination as part of M. De Brouwer's patent, as it had not been previously described or claimed in the patent. If they cannot, therefore, show prior public operation (which I question), then they have infringed my patent.

I have taken professional advice on this matter, and am informed that my patent is a valid one, and no infringement of M. De Brouwer's patent.

Manchester, Sept. 29, 1904. JOHN WEST.

Company v. Municipal Management.

SIR,—If no more convincing evidence can be produced wherewith to oppose the principle of gas-works purchase by local governing authorities than that put forward by the Secretary of the Industrial Freedom League in his letter to the "Herts and Essex Observer," reproduced in your last issue, I am afraid that even Sir George Livesey would be unable to do otherwise than advise such acquisition.

Whatever may have been his reason for so doing, the writer of the letter went back to the Boer War coal famine period to obtain some of his "awful examples" of municipally managed gas-works. Unfortunately for his argument, he compiled his list without discrimination, and included at least one town which, contrary to his intention, furnishes the municipalizer with plain proof of the wisdom of the latter's own opinion.

The following particulars provide sufficient proof of the folly of using the gas undertaking of the town referred to as a sad case of municipalization: Output, 94 millions per annum. Price of gas throughout the past fifteen years, 2s. 6d. per 1000 cubic feet, excepting 1900-3, when it was 2s. 11d. and 2s. 8d., owing to coal costing practically double. During the past nine years, discounts of 2½, 5, and 10 per cent. have been allowed off large accounts. During the past five years, meters have been supplied free. Owing to the considerable number of small consumers, the meter-rentals averaged slightly under 3d. per 1000 cubic feet. The price charged by the largest Company in the district has ranged from 3s. 9d. to 3s. 4d., *plus* meter-rents. All extensions of distributing mains, services, and meters have always been paid for out of revenue. After payment of capital charges, which are being liquidated at such a rapid rate that the annual sum required now equals (a dividend of) almost 10 per cent. on the capital outstanding, there remains an average net profit of about £1000 yearly. The latter would provide additional dividend, or bonus, of 4½ per cent. Possibly with the aid of the foregoing information, the Secretary of the Industrial Freedom League will understand that, in the case of one municipal undertaking at least, "deficiency" is synonymous with "sum required to be drawn from reserve to pay maximum dividend."

For myself, the instance under consideration is no more proof of the wisdom of bringing all gas undertakings under municipal control than the fact of the existence of such a well-managed concern as that of the Sheffield Company is any proof of the undesirability of municipal control. There are instances of good and bad management, and of fortunate and unfortunate circumstances, which may be cited in furtherance of either contention; but for such an instance as the one in question to be arrayed in opposition to the idea of municipal ownership appeared too absurd to be allowed to pass without comment.

Workington, Oct. 1, 1904. GEO. KEYTE.

The Merits of Carburetted Water Gas.

SIR,—Inasmuch as your article upon "The Merits of Carburetted Water Gas" is addressed for the greater part to a letter contributed to your columns by myself, I feel constrained, by your courtesy, to deal with the points raised in answer to my own.

Dealing with the contentions in their order, the first appears to be that a satisfactory result from a distributed mixture of carburetted water gas and coal gas is next to impossible. Your words are: "No one will dispute . . . that a good effect can be obtained with such a mixture, if accompanied by suitable regulation of the air supply . . . the proportion of carburetted water gas being liable to vary almost from day to day, while it is next to impossible to correspondingly regulate the air supply." If the foregoing means anything, it is an assertion that those supplying mixtures of carburetted water gas and coal gas are compelled, in order to get a good result, to adjust the air supply of the burners using the mixture from day to day, and that, failing this, the effect is unsatisfactory. It is obvious that to readjust every day the air supply of a multiplicity of burners constituting the whole of a public and private supply is impossible; therefore those supplying, satisfactorily, a mixture of carburetted water gas and coal gas are doing so under conditions which, to use your own words, are "next to impossible." Now, the whole area of the Gaslight and Coke Company is supplied under these said conditions, including the conspicuous instance of Victoria Railway Station. Further, on these said conditions, as premises, the future lighting of Aldwych by gas has been determined as against electric lighting. I may say all the Western, Northern, and Eastern Suburbs of London are lit under these said conditions. It would be wearisome to enumerate the provincial lighting that obtains under the same conditions, with the same unvaried and complete success. If what you say is true, all these districts are either badly and ineffectively lighted, or are lighted under a precarious condition of semi-impossibility. But I say that the districts which are systematically lit by mixtures of carburetted water gas and coal gas are well lit, and without any attendant inconvenience whatsoever.

The fact is—and it is borne out by overwhelming experience and evidence that is available to anyone honestly inquiring into the matter—that the first intelligent adjustment of burners to the requirements of a mixed coal gas and carburetted water gas will hold good in practical effect for all necessary variations of the mixture. Such effective adjustment is, in practice, generally a matter of pressure only. I again assert, on the grounds of experience, that a mixture of carburetted water gas and coal gas is better adapted to combustion under the Welsbach burner than coal gas alone, by reason of the lesser quantity of air consumed and the higher flame temperature. These remarks are equally applicable to gas stoves and engines. I specifically refer to gas lighting because, in so far as it is public, it is evidence patent to all, and subject to the adverse criticism of public authorities.

Passing to the next contention, you say: "The only thing which is established beyond all doubt is that in calorific value carburetted water gas is inferior to coal gas; and consequently no mixture of the two is, or can be, equal in this respect to coal gas alone." This, if I may be permitted to say so without a suspicion of discourtesy, simply exhibits an ignorance of the subject which it is affected to discuss. As a technical proposition, it is meaningless. To state the matter plainly, carburetted water gas of equal candle power to that of coal gas has, academically speaking, about 6 per cent. less of net calorific power. (See the report of Professor Lewes to the Birkenhead Corporation, in the "JOURNAL" for April 20, 1897, p. 893.).

The calorific power of carburetted water gas varies *pro rata* with the ingrediency of the oil used in its production, and is greater or less than that of any coal gas according to the intention of the manufacturer. The question is, therefore, whether carburetted water gas of equal calorific power to that of coal gas can be produced for less money than the latter. This, I contend, is the case under average market conditions; and while any personal contention is worthless in such a matter, I submit that the practice of the gas industry in Great Britain and on the Continent at the present day is paramount evidence of the fact. I have left illuminating power out of the question; but if, in addition to producing a gas of equal calorific power at a common, lesser, or slightly higher cost, you secure an additional 5 or 6 units of candle power in addition thereto, is that to be counted a disability? This surplus of illuminating power stands for additional light as a concomitant to a common calorific power; and the most insensate advocate of low candle power gas can hardly object to an addition of luminosity that costs little or nothing. It must, again, be remembered, in the matter of comparison, that the cost of coal gas falls *ipso facto* by the associated production of carburetted water gas.

With regard to the effect of carburetted water-gas manufacture upon the coke and coal market, whether the present satisfactory prices be temporary or otherwise, I maintain, for subjoined reasons, that these prices would never have obtained had it not been for the lightening of the markets, to the extent I have indicated, by the use of carburetted water gas. The opinion of the only considerable opponent of carburetted water gas, always excepting yourself, as reported, is against you on this point. The following is an extract from the Blue-Book report of the evidence given before the recent Royal Commission on Coal Supplies by the Chairman of the South Metropolitan Gas Company, with reference to carburetted water gas:—

> No. 12,587.—Q. Therefore, so far as the gas companies are concerned, it does relieve the market, and makes the price more easy to them for their particular coal?—A. Yes; no doubt.

At this moment, there is a serious report that the first weakening of the present Metropolitan coke market, to the necessary detriment of all the London and Suburban undertakings, has been initiated by the only important Company producing coal gas exclusively in the same area.

In your article, you assign an apparently anticipated fall in the price of coke to a fall in the price of coal as its cause. A reference to p. 898 of the same issue in which your argument appears will destroy it. Coal has not fallen appreciably below what it was six months ago. I submit that the fall in coke is largely a gratuitous one, and is an inevitable consequence of the deliberate policy of the South Metropolitan Gas Company, as opposed to the practice and interests of adjoining Companies operating under the commercial disadvantage of such contiguity.

Again, the following extracts from the evidence of the Chairman of the South Metropolitan Gas Company before the Departmental Committee on Water Gas in 1898 are noteworthy:—

> 126. We have now heard all the reasons for the adoption of water gas?—Some of the reasons may be classed as reasons or as advantages.

For instance, we have a great difficulty in dealing with our coke—the production exceeds the demand. In making gas, we must make coke; but we have a difficulty in disposing of it. That is one of the reasons why water gas is adopted—it takes coke off the market.

127. You have a difficulty in disposing of your coke?—We have; and that is what, I think, will force us to use carburetted water gas. With coal rising in price, coke has been decreasing. We have adopted the system of breaking the coke; and large quantities are used by the public, to some extent for domestic purposes.

134. (*Chairman:*) Have you any suggestion or point to make with regard to the advantages of water gas?—Tar is another article produced by gas companies; and from tar products of enormous value are obtained. These sub-products of tar are innumerable; and yet tar realizes no higher price than it did forty years ago, when the only products were pitch, creosote, and naphtha. Now we get dyes and disinfectants, and other things, out of it; but the result to the Gas Company is about the same—viz., 1d. a gallon. That is another argument in favour of water gas—it will largely take tar off the market by displacing coal.

136. You consider that the use of carburetted water gas would be an advantage to the consumer by diminishing the price of gas, and to the shareholder by raising his dividend?—Yes.

137. Notwithstanding that your Company have succeeded in paying a good dividend without making use of it?—Yes, we have; but we may have to come to it.

With regard to the coal supply, I must at once take exception to the attempt to obscure the issue by bringing the whole national supply into question, instead of confining the matter to its only legitimate area of discussion—namely, the gas-coal supply. I must respectfully traverse your statement that "gas coal is not a thing apart." In as far as it *ministers* to the requirements of the gas industry, I say it is a thing wholly and completely apart. It is all that is available for the purposes of the gas industry. All the other coal you refer to is appropriated to definite industrial purposes; and any attempt to divert any of it from those uses can only, as experience has shown, result in the accentuation of price, which is the *crux* of this whole discussion. Anthracite cannot be used in retorts; and if it could, its price would prohibit that use. Any coal will not do for gas making. If other coals than standard gas coals be used in the retorts at all, the variation in volume and quality has an adverse effect upon the selling price of gas. Therefore, for the purposes of the gas industry, I submit that gas coal, as its name indicates, in about its present quantities, is the only supply practicable at current prices.

Facilities in connection with the impracticable classes of coal supply will not help us. This alone makes the position sensitive and precarious; and to understand it the fact must be appreciated that carburetted water gas lightens the situation by over 14 per cent. with regard to the United Kingdom. But in my last letter to you, with the intention of being conservative, I did not refer to the extended use of carburetted water gas through North Germany, Belgium, Holland, Denmark, and Sweden, where some of the biggest gas undertakings, in what you will no doubt consider an utterly misguided way, are using large proportions of carburetted water gas, and have abated, to a proportionate extent, their demands on gas coal from our North Eastern ports. This effect must be added to my former statement in order to properly appreciate the situation. Although the gas industry cannot avail itself of many other classes of coal in the national supply, there is little or nothing to prevent the other coal-using industries from taking gas coal, at a price, if they so desire it. Gas coal may steam a steamship or a locomotive; but the steam coal of either is of no use to a gas-works. I say again, therefore, that, having regard to its available dimensions, the gas-coal supply of England is heavily overdrawn, and is not a basis on which the gas industry can any longer afford to exclusively rest. In corroboration of this argument, I refer again to the year 1900, when, without any corresponding increase in the demand from the gas industry, the price of gas coal went up from 50 to 60 per cent. Can any reasonable man dispute that an alternative source of supply is desirable under such circumstances? This contention you do not attempt to deal with.

With regard to subordinating the whole issue to "Field's Analysis," Mr. Broadberry's letter has shown that a vast economic improvement may be effected in the affairs of a gas company without the whole benefit attaching thereto appearing in the revenue account. I would further point out that, to reach any accurate conclusion in the matter, it would be necessary to establish, not only the financial position of gas companies using carburetted water gas in comparison with a period in which they did not use it, but also to realize what the comparison would be if they had not used carburetted water gas at all. A penny saved is a penny gained, whether it appear in a comparative statement or not.

In contrasting companies using water gas with those not using water gas, I again repeat that those who do not use it buy their coal and sell their coke at vastly better prices than they could realize but for the co-operation of those whose technical policy they seek to asperse.

4, *Brick Court, Middle Temple, E.C.*,
Sept. 30, 1904. A. M. PADDON.

Concession to Large Consumers at Dorking.—The report which was adopted at the half-yearly meeting of the Dorking Gas Company last Tuesday stated that, after providing for the interest on debenture stock, there was a balance available for dividends of £1850. The Directors recommended the payment of maximum dividends on all classes of shares, which would absorb £1570 and leave £280 to be carried forward. The sale of gas to private consumers had increased by 4·34 per cent. As from June 30 last, the Board had decided to make a special reduction of 3d. per 1000 cubic feet in the price of gas to consumers of 250,000 feet and upwards per annum. Attention was called to the continually-increasing item under the head of local rates, which now exceed 2d. per 1000 cubic feet of gas sold. The Urban District Council have accepted the Company's tender for public lighting for a further period of three years.

MISCELLANEOUS NEWS.

GAS, ELECTRICITY, AND WATER SUPPLY AT LEICESTER.

A New Naphthalene Remedy.

Meeting last Tuesday, the members of the Leicester Town Council had before them the half-yearly reports of the Gas, Electricity, and Water Committees.

Mr. EDWARDS presented the report of the Gas Committee; and in doing so first gave a number of figures referring to the financial results of the working in the six months. Having mentioned that the capital now stood at £1,094,190, he passed at once to the revenue account. The expenditure on coal was £47,925, which was a reduction of £132. On wages, £11,600 had been spent—an increase of £700; and on repairs and maintenance, £12,499 had been expended. Distribution amounted to £15,372—a decrease of £56. Rates and taxes came to £6021; and in management they had spent £2938—being a decrease of £575. The total expenditure amounted to £101,350. The income was £148,900, which was an increase of £7059. From the sale of gas they received £109,402, which was an increase of £3463. For the rent of stoves, they had £1460. From the sale of coke, they obtained £22,198, an increase of £3604; and from tar and ammoniacal liquor £15,330, a decrease of £337. Smaller items for gas fittings brought up the total income to £148,900—an increase of £7059. Deducting the expenditure, they had a profit of £47,638, which was an increase of £6289. Carrying this profit to profit and loss account, there were several smaller items which brought the profit to £48,285. This amount was disposed of by paying £19,332 for interest. The sum of £6948 had been added to the sinking fund; so that the net profit for the half year was £22,004. He thought the Council would agree with him that the profit they had made during the half year showed that the undertaking was very successful. The profit was a record for the first half of the year. The increased profit was due to three causes—larger consumption, low price of coal, and strict application to business by the Engineer and his staff. He (the Chairman) believed every man engaged in the concern from the bottom to the top had done his level-best to make the business a success during the half year. He did not, however, hold out any hopes that the profits of the second half of this year were going to be greater than the first, or as great. They had bad trade in the town; the town was not expanding to the extent it had done, and they had so popularized gas that almost every householder at the present time was a consumer. They had more than 52,000 gas-meters, 43,000 cooking-stoves, and 800 gas-engines connected up. Their profit, too, was largely made up by residuals, which represented one-third of their business. In the sale of these, the Committee had to compete with others in the market. They had been able to get 12s. 6d. per ton for coke during the half year; but now they could only get 8s. 6d. per ton. This would tell considerably upon the profits during the next six months. It was his intention to ask the Committee to reduce the price of coke to local consumers. The Committee had another success to record, and which the Council would like to know about. For fifteen years or more, they had been troubled with naphthalene, which was a universal difficulty. Every gas engineer and chemist had striven his utmost to try and find some remedy that would cope with what was recognized throughout the gas world as a great scourge. Many schemes had been tried, but none had met with complete general success. He remembered quite well Mr. Colson telling the Committee years ago when complaints were being made of the difficulties experienced throughout the town through naphthalene, that if they were patient, a remedy would be found by someone which would relieve them of the trouble. Mr. Colson had striven for years to find this remedy, and at last they believed his labour had been crowned with success. In the middle of May, when they were most free from the nuisance, he put his system into operation; and the results up to now had more than fulfilled their anticipations. It was a common thing for them to have from 100 to 600 complaints per day of stoppage of gas through naphthalene deposits. Since May, their average complaints had been fifteen per month, or one in two days, and these cases occurred in the district supplied from the old works, where the treatment had not yet been adopted. An apparatus had been put in the Belgrave works; and when it was in order, they believed naphthalene troubles would be ended. The Committee had already congratulated Mr. Colson on his success. Mr. Colson stood in the front rank of gas engineers; but this discovery had enhanced his reputation. The Leicester Gas-Works had always been looked upon as a model works. The system would not only be known as Mr. Colson's system, but also as the Leicester system. The Engineer, who was always very modest, told them that the effect his remedy would have on the profits of the department would be an important one. Mr. Colson estimated that it would mean at least an additional £5000 per year, and he (the Chairman) thought the saving would be even greater than that. It would naturally, he was sorry to say, displace a certain amount of labour, as they had had a number of men engaged in removing these obstructions; but such arrangements had been made that no men would be discharged. Mr. Colson had always taken great interest in his workmen; and he had found employment elsewhere for a number of the men, while the remainder would receive partial employment.

Mr. JENNINGS seconded the motion.

Mr. MANN asked whether the attention of the Chairman had been drawn to the fact that the South Metropolitan Company were supplying gas at 2s. per 1000 cubic feet; while in Leicester they had to pay 2s. 4d.

Mr. BANTON inquired if it was certain that Mr. Colson's remedy would be quite effective, and would not lead to a loss ultimately. A fear was expressed by some acquainted with gas manufacture and distribution that there might be evils in the course adopted that would show themselves in wear and tear of plant.

Mr. BRUCE pointed out that greater charges for carriage accounted for the difference in the price of gas in Leicester and London. He

was, however, of opinion that to some extent the price of gas should be reduced.

Alderman VINCENT remarked that the price of gas in Leicester was lower than in any town in the Midlands, which was the proper district with which to make comparisons. They congratulated Mr. Colson on his triumph.

Mr. EDWARDS, in reply, reminded Mr. Mann that they were a Corporation, and in South London the gas was supplied by a Company. Leicester borrowed their money from outside sources; and on this they had to pay interest. A company borrowed from their shareholders, and the interest was in dividends. The Corporation paid £40,000 a year in interest; and this represented 6d. per 1000 cubic feet of gas. If they had no interest to pay, they could charge 1s. 6d. per 1000 cubic feet. Then they had to establish a sinking fund, which a company did not do. Leicester did not charge meter-rents; if they did, this would bring in another £8000. He thought, taking these things into consideration, they were selling their gas cheaper than in London. As to the new naphthalene process, Mr. Banton had asked if it would have any drawbacks. The Committee believed not. A number of gas engineers had been down to Leicester to inspect the invention; and everyone had unbounded praise for it. The only thing that could get out of order was the apparatus used; and that was not a very expensive thing. They had no doubt as to the invention being a success.

The report was unanimously adopted.

Mr. EDWARDS next moved the adoption of the report referring to the Electric Lighting Department. Turning to the capital account, £5464 had been spent, and the total capital now reached £218,874. As to the revenue account, after meeting all expenditure, including £3221 in sinking fund, there remained a profit on the half year of £2570, which was an increase of £1269 upon the corresponding period of last year.

Mr. JENNINGS seconded the motion, and the report was unanimously carried.

Alderman WOOD then moved the adoption of the Water Committee's report. He observed that the profits during the six months amounted to £12,301. Out of this had been paid £3477—the half-year's amount of sinking fund—leaving a net balance of £8824, against £7670 profit for the corresponding half of last year. He was sorry to say that the state of their reservoirs was not at all satisfactory. The drain upon them had been much greater this year than in former years. They believed that 5 million gallons a day would be all that was likely to be demanded from the department; but this year it had been much greater, amounting last month to 5,617,000 gallons per day. If they had not commenced the summer part of the year with their reservoirs full, they would have been in a very great difficulty. Unfortunately, they were not yet within sight of the additional service from the Derwent River, which would not reach them for some years. If they had to encounter many dry seasons, the town would undoubtedly be exposed to very considerable difficulties.

Alderman COLEMAN seconded the motion, which was carried.

BRITISH GASLIGHT COMPANY, LIMITED.

The Half-Yearly Meeting of this Company was held on Wednesday last at the London Offices, No. 11, George Yard, Lombard Street, E.C. Mr. J. HORSLEY PALMER in the chair.

The SECRETARY (Mr. H. B. Chamberlain) read the notice calling the meeting, and also the report of the Directors for the six months ending June 30, together with the accounts of the Norwich station, as required by the Company's Act. The following is the report:—

The Directors submit the half-yearly accounts of the Company to the 30th of June, examined and certified by the Auditors, who have also vouched for the correctness of the several investments held by the Company.

The available profit is £24,521, after deducting the following sums, omitting shillings and pence: Income-tax, £1606; Hull debenture interest, £2142; Norwich debenture interest, £1133; Potteries debenture interest, £552; Trowbridge debenture interest, £166; Interest on debenture stock, £1470—total, £7070.

HULL—The gas-rental at this station shows an increase of £1003 as compared with that of the corresponding period of 1903; the price of gas having been the same—viz., 2s. per 1000 cubic feet. Coke shows an increase of £872; tar and tar distilling, £339; and ammoniacal liquor and sulphate, £714. Coals have cost 12s. 5d. per ton, as against 12s. 11d. Coke has realized 11s. 8d. per ton, as against 11s. 4d. The gas sent out was 575,175,000 cubic feet, against 551,317,000 cubic feet—an increase of 23,858,000 cubic feet, or equal to 4·32 per cent. Of this quantity, 48,046,000 cubic feet was supplied in bulk to the Corporation for the supply of the Old Town. The profit realized is £4702 in excess of the parliamentary interest. This sum will be invested; making the reserve fund £35,376.

NORWICH—The gas-rental shows an increase of £3343, as compared with that of the corresponding period of 1903; the price of gas having been the same—viz., 3s. 3d. per 1000 cubic feet. Coke shows an increase of £925; and tar and ammoniacal liquor a decrease of £417. Coals have cost 17s. 4d. per ton, against 16s. 9d. Coke has realized 8s. 7d. per chaldron, against 9s. 2d. The gas sent out was 229,007,000 cubic feet, as against 221,647,000 cubic feet—an increase of 7,360,000 cubic feet, or equal to 3·32 per cent. The profit realized is £2600 less than the parliamentary interest.

POTTERIES—The gas-rental shows an increase of £309, as compared with that of the corresponding period of 1903; the price of gas having been reduced from 2s. 8d. to 2s. 6d. from the 1st of April, 1903. Coke shows an increase of £662; and tar of £557. Ammoniacal liquor and sulphate exhibits a decrease of £239. Coals have cost 11s. 7d., against 12s. 2d. per ton. Coke has realized 7s. 5d., against 6s. 2d. per ton. The gas sent out was 196,167,000 cubic feet, against 187,166,000 cubic feet—an increase of 9,001,000 cubic feet, or equal to 4·80 per cent. The profit realized is £2255 in excess of the parliamentary interest. This sum will be invested; making the reserve fund £26,811.

TROWBRIDGE—The gas-rental shows an increase of £257 over the corresponding period of 1903; the price of gas having been reduced from the 1st of July, 1903, from 3s. 4d. to 3s. 2d. per 1000 cubic feet, with the usual discounts. Coke shows an increase of £138; and tar, ammoniacal liquor, and sulphate of £169. Coals have cost 15s. 4d., against 15s. 8d. per ton. Coke has realized 11s. 6d., against 11s. 3d. per ton. The gas sent out was 33,114,100 cubic feet, as against 29,956,500 cubic feet—an increase of 3,157,600 cubic feet, or equal to 10·54 per cent. The profit realized is £505 more than the parliamentary interest. This sum will be invested; making the reserve fund £1412.

HOLYWELL—The gas-rental shows an increase of £97; and residual products an increase of £43. The profit realized is £474.

The available profit added to the previous balance of profit and loss amounts to £56,410. From this sum, the Directors recommend a dividend at the rate of 10 per cent. per annum clear of income-tax. This will amount to £23,000, and leave a balance of £33,410.

The Directors who go out of office are Mr. Corbet Woodall and Mr. Robert S. Gardiner. The Auditors are Mr. Edward Yardley and Mr. E. Knowles Corrie; and they respectively offer themselves for re-election.

The CHAIRMAN, in moving the adoption of the report and accounts, said he could only regret that a larger number of shareholders was not present to hear the Directors' report and the comments on the accounts, because he thought those who were present would admit that the Directors were able to give a very favourable report as to the operations of the past half year. The Company had had, as the report stated, very pleasing increases at all the stations; and, owing to the admirable way in which the Engineers had commercially managed the affairs at the respective stations, the Directors were able to present this very gratifying report on the accounts and profits. He should like to make a few remarks with regard to their works. At Hull, as already reported to the shareholders, new extensions and alterations had been carried on in a very satisfactory manner. No. 1 retort-house (which was one of the oldest belonging to the station) had been pulled down; and in its place they had erected a house and bench of inclined retorts. Conveyors were now being put in; and the Directors hoped before long to be able to report that gas was being made in this new house on the most economical possible lines. This was only a portion of the new works which were contemplated. In the immediate future, the adjoining house (which was of the same date as No. 1) would be pulled down; and, when the Company's requirements necessitated it, a new house would be erected, and fitted with inclined retorts on the same system as those they now had in No. 1 house. In connection with this new work, he wished to say a few words with regard to what was known at Hull as the Bankside Road. This road ran between their works and the river, from which the Company received a considerable amount of their coal supplies. This road hitherto had not been taken over by the Corporation, nor made up in any but the roughest possible manner. However, the Corporation, having extended their jurisdiction to that part of the district, had now taken over this road, and had called upon the Company to so arrange their works that the road could be constructed in a proper manner. Of course, this put the Company to very great expense; but he was glad to say their relations with the town were of such a cordial and friendly nature that Mr. Alderman Massey, who was Chairman of the Corporation Improvements Committee, and the Borough Engineer had met the Company in the most liberal manner. There had been no difficulty whatsoever between them. The amount of money which each party would have to receive or pay had been settled, and, in fact, everything had been conducted in the most amicable spirit. He was glad to be able to report this, in order to show the appreciation of the Directors of the way the authorities at Hull had met them. The Company had also at Hull met the requirements in regard to public incandescent gas lighting. They had reduced the price for the large lanterns, and were continually putting up new incandescent lights throughout the district. The work was not yet completed; but the Directors hoped that, in the course of a few half years, there would be a complete system of incandescent gas lighting throughout Hull. With regard to Norwich, he had no doubt some of the shareholders had noticed that the price of coal had slightly increased compared with the corresponding period of 1903, while all the other stations showed a decrease. This could easily be explained by the fact that the state of the works at Norwich, which were being remodelled throughout the half year, necessitated the coal being dumped down in all sorts of unusual places; and therefore it had to be sometimes removed two or three times before being eventually brought into carbonization. This drawback would be done away with during the present half year; and he sincerely hoped, and had every reason to believe, that the alterations, extensions, and improvements they were making at the Norwich works would result in their being able to produce there much cheaper gas. They had had in the city many inquiries for a reduction in the price of gas for engines and manufacturing purposes; and the Board—believing it was a good policy to promote the use of gas for these purposes as much as possible—had made, and were making this half year, considerable reductions in the price. This would, the Directors hoped, please the consumers, and tend to further increase the consumption of gas. The Company had done remarkably well at Norwich during the half year, as compared with what used to be the experience of some five or six years ago. Their Engineer there (Mr. Thomas Glover) had made great efforts to push the sale of gas. He had succeeded admirably; the result being that the profit which was shown in the report was larger than in the previous half year. Not only was this so, but the Directors had carried out the policy mentioned at the last half-yearly meeting, of putting aside a sum from revenue for the purpose of writing off what might be called the old capital. This was a good policy to adopt when remodelling old works. Some shareholders might think this was taking money out of their pockets; but it was not so, because they were obliged, when replacing old works by new, to only charge to capital the cost of such part of the productive or other power as was in excess of that of the displaced plant. This writing off, he hoped, would be accomplished in the course of a few half years; and then the shareholders would reap the benefit of the expenditure. At the Potteries station, the new retort-house (which he described rather fully when the shareholders met on the previous occasion) was, practically speaking, completed; and he understood from their Engineer that gas would be made there during October. All the other work there was going on in a most satisfactory manner, notwithstanding that business generally throughout the Potteries was in a somewhat stagnant condition. They had had a fair increase there; and he saw no reason why the increase should not continue to a moderate extent. They hoped to improve the lighting of the district of Tunstall (where they had had some difficulties owing to the smallness of their Brownhills works) by the laying

of a big main from the Etruria works through Burslem. This was under the consideration of the Board; and if it was carried out, it would give great relief in the Tunstall district, and improve the Company's position there. He wished to also say a few words with regard to their little station of Trowbridge, which was remodelled about three half years ago. Their former Engineer, who had served them faithfully for a great many years, retired; and the Directors placed the management of the station in the charge of a young man who had been doing good work for the Company at Holywell. He was glad to say their new Manager's work at Trowbridge had been exceedingly satisfactory. Good results were shown, owing to the energetic way in which he had pushed the business. For that station there was a considerable increase in the profits, notwithstanding that the price of gas had been reduced. In conclusion, he (the Chairman) wished to make a few remarks with regard to the financial situation of the Company, because he met a shareholder the other day who said to him: "What an enormous amount of debentures and debenture stock the Company are issuing; is not that damaging the interests of the shareholders?" True, the balance-sheet showed a long list of mortgage debentures; but they were not of large amounts. They were set out in this separate fashion because it was in accordance with their Acts of Parliament, and showed what amounts they were able to raise by the different Acts, and at what rates of interest. But the business had so increased at all the different stations that, when the shareholders looked on the right-hand side of the account, they would see that the gas-works and the capital employed to work them represented no less a sum than £1,129,000 in round figures, while the debenture issue was at present only £333,000. He hoped the shareholder to whom he referred was present, so that the remarks he had made might allay his anxiety in this respect. He was perfectly convinced that the shareholders had an absolute security in regard to their share capital, and that the debentures also were fully secured.

Mr. Frederick Wilkin seconded the motion, which was unanimously carried.

Proposed by the Chairman and seconded by Major-General Corrie, a dividend was declared of 20s. per share, clear of income-tax.

The retiring Directors (Mr. Corbet Woodall and Mr. R. S. Gardiner) were re-elected on the proposition of the Chairman, seconded respectively by Mr. F. Wilkin and Major-General Corrie.

Moved by Mr. Graham Wilkin, and seconded by Mr. J. R. Heath, the Auditors (Mr. Edward Yardley and Mr. E. Knowles Corrie) were reappointed.

Mr. Bernard F. Harris moved, and Mr. Louis Penny seconded, a vote of thanks to the Chairman and Directors—the former gentleman remarking upon the large growth of the business during the last few years.

The vote having been unanimously carried,

The Chairman, in acknowledging it, said it was true the business of the Company had increased enormously during the past few years. He had not the figures with him; but he had entertained the idea of pointing out to the shareholders how enormously the capital and consequently the responsibilities of the Directors had grown during the last ten years. They had now much larger sums of money to deal with, and they had had great difficulties to encounter—particularly in regard to the raising of capital. This was a matter that had been a considerable strain upon the time and attention of the Board.

Mr. Corbet Woodall moved a vote of thanks to the Secretary, the Engineers at the various stations, and to the staff generally. The Chairman, he said, had spoken of the amount of work that had been done in the past year with regard to financial matters, which had no doubt been a heavy addition to the already heavy burdens of the Secretary. With regard to the works, he mentioned at the last meeting something about the works that were being carried out at Norwich, under great difficulties and yet so successfully. The report that had been presented—giving the very best return they had had for a long time—was, he thought, a very fair comment upon those observations, and a happy forecast of what they hoped would be when the works were finished. He had had the pleasure of seeing the new works in the Potteries; and he was very proud of them. They had attracted a considerable amount of attention in the neighbourhood; and everybody who had seen them spoke in high terms of their design and appearance. He felt quite sure, when the works were brought into use, they would see in the Potteries—good as their results had been there—still further progress. The officers who were serving them at all the stations were deserving of complete confidence and their sincere thanks.

Mr. R. S. Gardiner seconded the motion, which was very heartily agreed to.

Mr. Chamberlain having responded for himself and his colleagues, the proceedings terminated.

ALLIANCE AND DUBLIN CONSUMERS' GAS COMPANY.

The Ordinary Half-Yearly Meeting of this Company was held last Friday, at the Offices in D'Olier Street, Dublin, under the presidency of Mr. Charles Lawlor, J.P., the Chairman.

The Secretary and Manager (Mr. Francis T. Cotton) submitted the Directors' report, which was noticed in last week's "Journal" (p. 893).

The Chairman, in moving that the report and statement of accounts be received and adopted, said the shareholders would see by the latter that the sale of gas has been 24,245,000 cubic feet more than in the corresponding period. This was due to the increased number of coin or slot meters now in use. Although there was this increase in the quantity of gas sold, there was a decrease of £1532 in the receipts, owing to the reduction which took place in the price of gas of 2d. per 1000 cubic feet at the beginning of the year. This reduction amounted to £12,500 per annum. The sum received for residual products—consisting of coke, sulphate of ammonia, liquor, breeze, and tar—was £23,906, which was a reduction of £571 as compared with the corresponding period. This was due to the decrease in the price realized for tar. They had now in use 18,075 prepayment meters, which was an increase of 2981 over the corresponding period. They had also 17,355 cookers in use, or an increase of 2340. The number of ordinary consumers was 17,000. The arrangements made for taking in charge and keeping in order incandescent burners free of expense to the consumers continued to work most satisfactorily. The Directors regretted to announce the unexpected death of Mr. Edwin Waterfield, Chief Engineer of the Company. He was in the Company's employment for nearly forty years in the engineering department; and during this time he carried out several most important works, and effected many improvements in the manufacturing and distributing departments of the Company's business. The Board had appointed Mr. William Francis Cotton, jun., M Inst.C.E., son of Alderman Cotton, to fill the vacant position. Mr. Cotton had been in the engineering department of the Company for a period of over thirty years.

Mr. Maurice Brooks, D.L., seconded the adoption of the report, which was agreed to unanimously.

Dividends at the rate of 10½ and 7½ per cent. on the respective shares were next declared.

A vote of thanks was accorded to the Directors for their valuable services during the half year; and a similar compliment was paid to the officers of the Company, for the efficient manner in which they had discharged their duties.

Mr. M'Bride, in seconding the latter proposition, expressed his gratification at the fortunate circumstance that an officer in their employment was qualified to fill the position of Chief Engineer.

The votes of thanks having been suitably acknowledged, the meeting concluded.

NOTTINGHAM GAS SUPPLY.

The Question of Illuminating Power.

A report has been prepared by Mr. J. H. Brown, the Gas Engineer to the Nottingham Corporation, on the subject of the illuminating power of the gas supplied to the city; and it was to come before the Council yesterday. Some extracts from the report have appeared in the local Press; and from these we gather the following particulars.

Referring to the reports on the undertaking prepared by Sir George Livesey and himself in 1902, Mr. Brown recalls the fact that the chief points made were the unreasonably high candle power of the Nottingham gas and the folly of spending money on mistaken enrichment, when a reduction from 18½ candles to a much lower standard would be no disadvantage to the consumer. Sir George Livesey recommended a reduction to 14½ candles; and Mr. Brown an immediate reduction to 17 candles, and then gradually to 15 candles, with the introduction of incandescent burners and fittings and oversight by the department to see that the gas was properly consumed. After carefully considering the matter, the Committee instructed Mr. Brown to reduce the gas to 16-candle power. This was gradually effected, and no special notice of the change was taken by the consumers; and apart from the officials of the department and the Committee, no one in Nottingham was aware that the change had been made. During the summer months, with the consent of the Committee, the candle power was reduced for a short period a considerably further amount; and during the six weeks this very low candle power was supplied, the complaints from consumers as to bad light and poor quality of gas were very much less than they had previously been. At the end of this period, the matter was reported fully to the Gas Committee; but, unfortunately, it was made public that some reduction in candle power had taken place; and although prior to the matter being reported to the Committee the candle power had been brought back to its normal standard, innumerable complaints were received from many of the consumers. The candle power was afterwards maintained at the amount previously fixed by the Committee.

During the present summer, extensive alterations in the distributing arrangements have been undertaken, which have naturally considerably interfered with the regularity of the supply; and Mr. Brown says there is no doubt that many complaints as to the quality of the gas have been due entirely to this cause. As, however, it has often been affirmed that the reduction in the illuminating power has been entirely answerable for the complaints, he has (to satisfy the Committee that the steps they had taken were in the best interests of the consumers and of the department) written to all the most prominent experts in the industry, asking their opinion on the question of reducing the nominal power of the gas supply to (say) 14 candles. Mr. Brown, on this point, says: "Several of the engineers who have replied to my inquiry have had as much as two and three years' experience in the supply of gas of a considerably lower candle power than we are at present supplying; and if gas companies, which have always to meet very serious competition with electric light, oil-lamps, &c., and whose chief interest is to give their consumers satisfaction, and to work their undertaking in order to pay dividends to their shareholders—if these companies consider that it is advisable to adopt this course, surely the Nottingham Corporation will do well in following their advice. Leicester, Manchester, Glasgow, Leeds, and several other large corporations, have already reduced their candle power, and in some cases as much as 5 candles. Sir George Livesey, in the course of correspondence, wrote: 'You have a difficult task over the reduction of illuminating power, due to ignorance and prejudice; but I am sure you are right. . . . The consumers do not burn more gas; their accounts are not larger; the complaints of bad lights are certainly not more numerous than before the change was made—we feel safe in saying rather less; and the public and private lighting are certainly not inferior. The advantages are many and great. I start with the axiom that it is a mistake to supply gas of higher illuminating power than can be readily obtained without enrichment from the available supply of coal—that is, the cheapest gas coal that will yield a large make per ton and a good yield of coke. . . . We (the South Metropolitan Gas Company) did not find the full benefits at once, and have not even yet reached them; but year by year from the change our working has become more economical and more satisfactory. In our case, the unenriched gas is certainly better for the consumers. In fact,

it is no use giving the consumers gas of a high quality; they do not know how to burn it, and simply waste the light. What is wanted is to instruct and assist the consumers to use their gas to the greatest advantage by providing suitable burners, and also by providing them with gas of uniform quality from day to day and month to month. An enriched gas is not likely to be uniform; the unenriched, therefore, has the advantage. I believe you enrich with mixtures of coal, which is, I think, the best method. Enrichment by spirit or by carburetted water gas are, in my experience, very unsatisfactory. Spirit enrichment is unreliable; and carburetted water gas enrichment results in a mixture of inferior heating power. The 16-candle gas of the Gaslight and Coke Company was stated before the Board of Trade Committee to be inferior in heating power to the 14-candle gas of the South Metropolitan. At any rate, the units of heat per candle were found to be less in the 16-candle mixture of coal and carburetted water gas than in the simple 14-candle coal gas of the South Metropolitan. Moreover, where this form of enrichment is used uniformity of quality is not attained; and then seeing that the bunsen burners of gas-stoves and gas-fires are adapted to coal gas of uniform quality, the mixture very seriously detracts from their efficiency—at least, this is the experience of the South Suburban Gas Company. Another advantage is the greater comfort in working for engineers, foremen, and workmen, which is our happy experience of unenriched gas.'"

Mr. Brown says there is no doubt that practically the whole of the complaints received at Nottingham as to bad lights and poor quality of gas are entirely due to the misuse of the gas and ignorance as to what burners should be used; but he points out that the past summer (owing to the unusual heat and rapid changes of temperature) has been a very difficult period for all gas undertakings, which have been seriously inconvenienced by naphthalene deposits. As the result of careful investigations of complaints as to quality in Nottingham, in only one case was a burner found which would give half the available illuminating power contained in the gas. Mr. Brown's opinion is that "this evidence tends to show that what is wanted is not a higher candle-power gas, but better knowledge on the part of the consumers, and a more economical and efficient type of burners and apparatus. One fact must be carefully borne in mind—namely, that many of the complaints which arise are due to the fact that during the last few years the light demanded by consumers is considerably greater than was required previously. The eye has become accustomed to the brilliant illumination derived from the use of incandescent burners, and is dissatisfied with the out-of-date methods of gas consumption through flat-flame burners; and it should also be remembered that the gas which is admired in the brilliantly-lighted shops, offices, and warehouses, where incandescent burners are in use, is exactly the same as that which is complained of by consumers with ordinary and, in many cases, worn-out flat-flame burners. If incandescent burners are unsuitable for either domestic or factory lighting, if a good type of flat-flame burner be used, and renewed periodically as is necessary, a much superior light will be obtained with a 14 than with the present 16 candle power gas. It is a very common fault indeed on the part of consumers to obtain a cheap form of burner, and to expect it to last for an indefinite period without attention or renewal. We are already taking in hand the inspection of the gas-pipes in all buildings prior to connecting our meters; and in the interests of the Gas Department and of the consumers generally, the Committee should also be prepared to send competent men to advise our consumers of the best forms of burners and other appliances, and to ensure that our gas is consumed in the most economical manner. This, I am convinced, will entirely avoid the complaints which are at present received as to the poor quality and inferior lighting value of our gas supply."

FARNWORTH GAS COMPANY'S JUBILEE.

Important Developments.

The jubilee of the Farnworth and Kearsley Gas Company, Limited, which has just been celebrated by an excursion to Blackpool, where the Directors entertained the whole of the workmen to dinner, will be marked by extensive alterations and improvements to the works.

The Company, which was established in the autumn of 1854, as a protection against the encroachments of the then Bolton Gas Company, had an original capital of £20,000, which had now grown to £68,500; while shares to the value of £93,000 remain to be issued. A loan capital of £25,000 is also authorized; but as yet nothing has been raised. The capital account of the concern shows a total expenditure of £80,483, covered by £68,500 issued in stock, £4974 in premiums on the public sale of stock, and a credit balance of £7008. The reserve fund stands at £15,060. The first price for gas was 4s. 9d. per 1000 cubic feet; and in 1855, this was raised to 5s. 6d. Since then, by successive reductions, it has been brought down to 2s. 8d. net, for customers whose consumption is under 4000 cubic feet per quarter; while gas for public lighting is charged at 2s. 4d. The first year's make was 3,205,000 cubic feet; and this has gradually grown to some 136,000,000 feet. The original storage capacity was 100,000 cubic feet; and now it is 893,000 feet. The coal storage is equal to 3150 tons; and there have been 3000 tons of coal and cannel in stock. The carbonizing plant consists of 224 retorts, capable of making 138,800 cubic feet per day. At the beginning of the present year, the Board decided to alter the system of heating the retorts in the larger of the two benches, which contains nine out of the sixteen ovens. These used to be direct-fired; but when rebuilt they will be on the generative system. The work is in progress, and is expected to be completed in the early winter. As to the method of charging, manual labour is to be largely replaced by machine stoking. The coal, as delivered, will be elevated and conveyed into a continuous storage hopper running the whole length of the bench. From the hopper, the coal will fall into a series of measuring chambers, each holding a charge for one retort, and from

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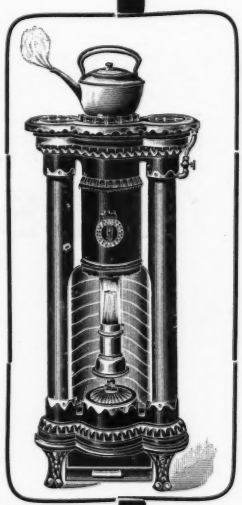

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thence be delivered by means of a De Brouwer projector, electrically driven, power for which will be provided by a gas-engine.

At the present time, the Company's mains extend over 53 miles. The public lamps number 697; and the consumers (including those using slot meters) number 6595. Some 80 per cent. of the inhabited houses in Farnworth and Kearsley are connected with the supply. The "penny-in-the-slot" system was only begun in 1895, when 62 meters were fixed. These had now increased to 2030; and last year there were collected 584,000 pennies, or about 5¼ tons of copper; this sum (£2434) being about one-fifth of the total receipts for gas.

The Chairman (Mr. J. W. Watkinson) has been seven years in office; and the Secretary (Mr. W. Bromley) has been a servant of the Company for 21 years.

THE NEW CHAIRMAN OF MESSRS. WILLEY AND CO.

A Meeting of the employees of Messrs. Willey and Co. was held at the Exeter works last Thursday, under the presidency of Mr. F. T. Depree, J.P., the new Chairman, who was supported by members of the Board, the heads of departments, and Mr. T. Glanfield, the Secretary. Mr. Depree announced that Mr. Willey, on the formation of the Company last January, reserved the power of nominating his successor in the chairmanship; but he (Mr. Depree) never thought, when Mr. Willey spoke to him on the subject, the power would have to be exercised so soon. Now, in accordance with Mr. Willey's nomination, he (the speaker) became the Chairman of the Company; and he had taken that early opportunity of calling the employees together to ask that the loyal support which they had hitherto given the head of the firm should continue to be extended to the present Directors. The City Council had placed on record their sense of the loss which the city and county —and, indeed, the whole world—had sustained by the removal of a character unique of its kind; and the Corporation proposed to take steps to erect a memorial to Mr. Willey. But he wanted to press home on the employees the fact that the best memorial they could give to Mr. Willey, and the greatest tribute they could furnish to his memory, would be to do the best they possibly could for his family and for the Company with which he was so intimately connected. He made this appeal not only to the workmen, but to the firm's outside representatives and the engineering staff generally; for unless they got the orders, the men could not do the work. Mr. Depree referred to the interest Mr. Willey took in the welfare of working men generally, as shown by his gifts of the Manual School and the *crèche*; and he said that Mr. Cash, the Auditor to the firm, who was executor of the will with Mrs. Willey, had promised to do all he could to further the interests of the firm. He thanked those present for attending in such large numbers, and said he looked forward with confidence to their hearty co-operation to make the business even more successful than ever, and thus maintain in the city a lasting memorial to their late chief.

THE LIGHTING OF ORMSKIRK WORKHOUSE.

At a Meeting of the Ormskirk Urban District Council last Tuesday—Mr. F. A. Jones presiding—the heavy addition to the rates was referred to, and Mr. C. F. Ellis, in supporting a resolution condemning the increased expenditure, said it was not only in connection with the County Council that it had been incurred, for it was by some of their local bodies. For instance, the Board of Guardians had adopted a proposal to put down electric plant of their own, to cost the ratepayers upwards of £3000, when the Ormskirk Council, under their scheme, were willing to supply them with current at as cheap a rate as that at which they themselves could produce it, or even cheaper. He asked whether this was a wise policy to adopt. The Chairman of the Board had done his best to have the matter deferred, so that they could get all the figures before them, and be able to come to a calm and proper decision. Instead of this, they decided to have electric light. He looked upon the Guardians' scheme as a wilful and wanton waste of public funds; and he hoped that when the Local Government Board were asked for sanction to borrow the money, they would see their position in a clearer light, and stay their hands. He said he felt very strongly on the matter, and believed the ratepayers did not recognize their position. Though the Guardians, at their meeting on the 22nd ult., decided, as reported last week (p. 895), to light the workhouse with electricity, and generate their own current, their action has met with considerable criticism in various parts of the union. Many of the ratepayers hold, after reading the report of the discussion, that the question should have been deferred for another fortnight, to enable fuller inquiries to be made, and to ascertain whether the Guardians or the District Council would be able to supply the current at the cheaper rate; to give the Gas Company the opportunity of carrying out the installation agreed upon; and to see which was the better illuminant. The Guardians will be committed to an expenditure of more than £3000, of which £1500 has already been spent in the laying down of steam plant for the general use of the workhouse.

THE PUBLIC LIGHTING OF NORWICH.

The Norwich Town Council, at their last Meeting, had before them a recommendation of the Executive Committee that the offer of the Electricity Committee to light Prince of Wales Road, from Thorpe Station to Bank Plain, with twelve arc lamps, at £16 per annum each for eight lamps lighted all night, and £12 per annum each for four lamps lighted up to midnight, be accepted, and that notice be given to the British Gaslight Company to discontinue 42 gas-lamps proposed to be superseded.

In moving the adoption of the recommendation, Mr. Youngs stated that the cost of lighting the twelve lamps would work out at £176;

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and as far as he could ascertain, the cost of the present gas-lamps was £150. Therefore there would be an additional cost of about £26; but the extra light would be a great advantage, and would fully compensate for any additional outlay. Mr. Curl said that the electric arcs in the Market Place did not throw a light on the ground like the gas; and he suggested that if the new ones were to be of the same kind, they should be placed lower. Mr. Scarles remarked that he was not against the extension of the electric light; but he was against the waste of the lamps on Prince of Wales Road. Only three years ago the Committee gave great attention to the lighting of the road; and they were supposed to buy the best lamps in the kingdom. He wanted to know what was to become of these valuable lamps. Mr. Chamberlain said they would be utilized elsewhere. Another member expressed the opinion that the gas-lamps now in the road "were veritable death-traps;" being, with their jagged edges, within a few inches of every tramcar that passed.

The recommendation was agreed to.

METROPOLITAN WATER BOARD.

The first Meeting of the Board after the summer recess was held on Friday, at the offices of the Metropolitan Asylums Board—Mr. R. M. BEACHCROFT in the chair.

The Finance Committee reported that the Court of Arbitration confirmed on the 28th of July the agreements which the Board had resolved to enter into with the respective Water Companies, providing for the discharge, wholly or partly, in water stock of the sum payable as compensation for the transfer of their undertakings. This compensation was duly discharged on the 1st of September. The confirmed agreements provided for the payment of the compensation in accordance with the revised statement submitted to the Board on the 22nd of July, and for the discharge of the compensation due to the Companies on Sept. 1. They accordingly arranged for the stock to be inscribed in the names of the respective Companies in the several amounts, and on Aug. 29 passed the following resolution: "That the Bank of England be, and is, hereby directed to inscribe the Metropolitan Water (B) stock to the amount of £26,284,609 5s. 4d. in the names of the respective Metropolitan Water Companies." The several amounts were as follows: £3,600,242 16s. 8d., Chelsea; £3,832,335 15s., West Middlesex; £2,954,091, Kent; £4,056,322 13s., East London; £3,514,950, Grand Junction; £4,664,700, Lambeth; and £3,661,967 os. 8d., Southwark and Vauxhall.

The Finance Committee also reported that a sum of £690,990 12s. 4d. was required in cash to complete the discharge of the compensation awarded to the Companies; and, in pursuance of the resolution of the Board of July 22, authorizing them to make arrangements for a temporary loan for the purpose, they communicated with the Local Government Board, and obtained their formal consent, under section 16 of the Metropolis Water Act, 1902, to the raising by the Board of the sum in question by a loan from the Bank of England, for a period not exceeding one year. The Committee found that, having regard to the balances in the hands of the Board's bankers, only £400,000 was actually necessary for the time being; and they arranged with the bank to advance this amount accordingly. This loan would be repaid out of the capital moneys to be raised for the purposes of the Board in the near future. The Committee further stated that the Local Government Board had issued an order assigning to Mr. Arthur Carson Roberts, District Auditor, the audit of the accounts of the Water Board for each of the financial years ending respectively on March 31, 1904, and March 31, 1905. Mr. Roberts began the audit of the accounts for the year ended March 31 last on the 6th of September.

The Works and Stores Committee in their report stated that, in view of the question of the purity of the Board's supplies, they had appointed a Sub-Committee to consider the question of the pollution of the Thames and Lea above the intakes; and in order that this duty might be performed in an efficient manner, it would be necessary to incur expenditure. A sum of (say) £500 should be placed at their disposal for the purpose; and having forwarded the necessary estimate to the Finance Committee, they recommended—"That the estimate of £500 to be submitted by the Finance Committee be approved as an estimate of costs, debt, or liability under section 20 (3) of the Metropolis Water Act, 1902, and that the Works and Stores Committee be authorized to incur expenditure not exceeding that amount in connection with their investigation on the subject of the pollution of the Rivers Thames and Lea above the intakes. The recommendation was agreed to. The Committee also presented a return giving information relating to the supply of water for the month of August. It showed that the total average daily quantity sent out was 237,997,000 gallons. The number of houses, &c., supplied was 992,236, and the total estimated population 6,569,157. The quantity of water in store in impounding reservoirs at the end of the month was 3230 million gallons. The number of additional supplies laid on was 1516; while the length of new mains laid was 8195 yards. The average rainfall of all the districts was 1·68 inches.

In the report of the Appeal and Assessment Committee, it was stated that the Committee had considered a large number of appeals and complaints concerning water charges received during the recess. Many of these involved important questions of principle, upon which they should not be prepared to make recommendations to the Board without further consideration. They were, moreover, compelled to bear in mind that under the Metropolis Water Act, 1902, section 15, the Board must not, until Parliament otherwise determined, reduce the rates charged for the supply of water below those in force during the quarter ending June 24, 1902, unless the Board were satisfied that such a reduction would not cause a deficiency in the water fund. No doubt experience would show that many of the appeals and complaints were not isolated ones, but were types of numerous other cases that had not yet come forward, and that might, in fact, be awaiting the Board's

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decision. Therefore, even where a case contained features of apparent harshness, it was necessary to exercise the greatest care and discrimination in dealing with it, lest a precedent should be set the following of which would involve the Board in important financial considerations. In these circumstances, they were causing the appellants to be informed that, having regard to the restrictions contained in the Metropolis Water Act and to the important points of principle involved, the Board were not prepared at this early date to interfere with the prevailing custom of the district.

The General Purposes Committee brought forward an urgency report, in which they stated that in July the Board passed a resolution referring to them, for consideration and report, the question as to whether there should be added to the Standing Orders one to the effect that all fees received by the representatives of the Board on the Thames and Lea Conservancies, or on any other public body, should not be retained by such representatives, but should be paid by them—less travelling expenses, if any—into the water fund. The Committee pointed out that Parliament had provided for the payment to the Conservators of a sum of money divisible among them, presumably in view of the fact that considerable out-of-pocket expense was involved in the proper carrying out of their duties, which frequently necessitated attendance in distant parts of the Thames and Lea valleys. The Committee knew of no good reason why the manifest intentions of Parliament in this matter should not be given due effect to; and they therefore recommended that no Standing Order should be made. A long amendment was moved by Mr. Pickersgill; but, after discussion, it was lost, and the recommendation was passed.

Other business was transacted, and the Board, who are now located in their new offices at Savoy Court, Strand, adjourned.

NOTES FROM SCOTLAND.

From Our Own Correspondent.

Saturday.

Looked at in any way we please, it must be accepted that a most auspicious beginning has been made with the work of the Scottish Junior Gas Association. There was a very large muster of the members at Granton this afternoon; and as to the demeanour of the meeting, it was impossible to overlook the tone of seriousness which prevailed. The Juniors have no idea of a holiday when they meet. They have formed themselves into an Association for the purpose of bettering their position; and they seem to be resolved to take advantage of every opportunity of attaining their object. This was the feeling which came uppermost in watching them in their quest for information. It is a feeling which augurs well for the future of the Association, as well as for the future of the gas industry. Quite a professional feast was provided for them through the courtesy of the Edinburgh and Leith Gas Commissioners, and of Mr. Herring, their Chief Engineer, in permitting them to visit the Granton Gas-Works, which should strengthen the faith of the members in the truth of the old adage that help from a higher power is forthcoming to those who wish to help themselves. It is an exceedingly hopeful sign when those who have charge of such magnificent works are willing to allow young men to study them in the practical way which was enjoyed to-day. It was a meeting for the receipt of instruction, not for the intercommunication of it, as some of the other meetings will be. And if the members have reason to be thankful for the excellence of the fare which was placed before them, in the permission to view the works, there must also be the co-ordinate feeling in their hearts that the President—Mr. A. Masterton—in his exceedingly thoughtful address, gave them, out of his store-house of knowledge, a very great deal which they may ponder over with advantage. The Association have begun well. It rests with themselves to carry on the good work they have inaugurated. They are having every encouragement to do so; and to-day's meeting gives good grounds for the belief that they will strenuously persevere in what they have put their hands to.

The Edinburgh and Leith Gas Commissioners on Monday adopted estimates for the current year's working, and continued the prices of gas at the same figures as they have been since last October. These are: To ordinary consumers, 2s. 9d. per 1000 cubic feet; to consumers with prepayment meters, 4s. 2d.; to consumers in out-districts, 3s. 3d.; and for public lighting, 2s. 5d. The estimates contemplate a sale of 1,836,264,000 cubic feet of gas, which is 3000 cubic feet less than the quantity that was sold last year. The revenue from the sale of gas is stated at £252,774, which is a decrease of £6636 upon last year's sales, the decrease being accounted for by the fact that from May to October, 1903, the price of gas was 3d. higher than it was afterwards. Coke is expected to produce £21,961, an increase of £4283; gas tar and oil gas tar £13,308, a decrease of £4932; and sulphate of ammonia £19,985, a decrease of £61. The total revenue is estimated at £308,549—a decrease of £7331. On the expenditure side, it is estimated that 179,276 tons of coal will be used, which is the quantity used last year; but the price will be £107,566, a decrease of £9654. Of gas oil, the estimate is 1246 tons—the quantity used last year, and the price will be £3332, a decrease of £732. Salaries and wages at works are stated at £27,052, a decrease of £4275; and purifying materials and wages of purifier men at £2620, a decrease of £1783. The total cost of manufacturing gas is estimated to be £154,983, a decrease upon the actual cost last year of £16,695. Distribution of gas is stated at £27,437, a decrease of £3440. Management is to cost £11,150, an increase of £705; feu-duties, rates, and taxes, £13,330, a decrease of £544; pensions and allowances, £1950, an increase of £216. The total cost of carrying on the works is stated at £216,600, a decrease of £19,809. Annuities, interest, sinking and reserve funds, together with the deficit of £4390 upon last year's working, raise the total expenditure to £305,840; and there is an anticipated surplus, after wiping out the existing deficit, of £2709. The estimates have been prepared with the utmosf care; and they should be realized

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WINDSOR ST. WORKS, BIRMINGHAM	2,000,000	KINGSTON, PA.	125,000	STRETFORD	500,000
SALTLEY WORKS, BIRMINGHAM	2,000,000	PETERBOROUGH, ONT.	250,000	OLDBURY	300,000
COLCHESTER	300,000	WILKESBARRE, PA.	750,000	TODMORDEN	500,000
BIRKENHEAD	2,250,000	ST. CATHERINES (2nd Cont)	250,000	SALTLEY, BIRMINGHAM (Third Contract)	2,000,000
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SALTLEY, BIRMINGHAM (Second Contract)	2,000,000	WINNIPEG, MAN.	500,000	ROCHESTER (Second Contract)	500,000
WINDSOR ST., BIRMINGHAM (Second Contract)	2,000,000	COLCHESTER (Second Contract)	300,000	NEWPORT (MON.)	250,000
HALIFAX	1,000,000	YORK	750,000	TOKIO, JAPAN	1,000,000
TORONTO	250,000	ROCHESTER	500,000	PERNAMBUCO (Brazil)	125,000
OTTAWA	250,000	KINGSTON, ONT.	300,000	MALTON	150,000
LINDSAY (Remodelled)	125,000	CRYSTAL PALACE DISTRICT	2,000,000	DULUTH, MINN. (2nd Cont.)	300,000
MONTREAL	500,000	DULUTH, MINN.	300,000	BROCKVILLE (ONT.)	250,000
TORONTO (Second Contract Remodelled)	2,000,000	CATERHAM	150,000	SMETHWICK	500,000
BELLEVILLE	250,000	LEICESTER	2,000,000	GRAVESEND	300,000
OTTAWA (Second Contract)	250,000	ENSCHEDE (HOLLAND)	150,000	NEWPORT MON. (Second Contract)	250,000
BRANTFORD (Remodelled)	200,000	BUENOS AYRES (RIVER PLATE CO.)	700,000	TORONTO (Third Contract)	750,000
		BURNLEY	1,500,000	TORONTO (Fourth Contract)	1,000,000
		KINGSTON-ON-THAMES	1,750,000	MONTREAL, ONT. (2nd Cont.)	1,800,000
		ACCRINGTON	500,000	HAMILTON, ONT.	400,000

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without the slightest difficulty. It was reckoned that the valuation of the undertaking had been fixed at £84,043—a decrease of £1335 upon last year. The Commissioners resolved not to contribute towards the funds of the International Gas Exhibition at Earl's Court.

The traders in Edinburgh and Leith who object to the Gas Commissioners dealing in gas appliances are impatient at the length of time which the Commissioners are taking in the treatment of their memorial. They addressed a letter to each of the Commissioners, asking to be heard at the meeting on Monday, and stating that they represented about 350 traders in Edinburgh and Leith, and that they viewed with concern the action of the Commissioners in undertaking the supply of appliances such as gas-fires and gas-fittings, and in providing the materials and labour involved in the fitting up of those free of charge; also the sale of cooking utensils. While fully aware that in so doing the Commissioners were acting within the powers conferred on them by Act of Parliament, and admitting that circumstances could be imagined under which it might be needful, in the public interest, to increase these powers, they submitted that, inasmuch as in present circumstances private enterprise had proved itself quite able to meet the demands of the public, and the amount of competition in trade protected the public from the danger of excessive charges, that line of policy was unnecessary. It was understood that only a small proportion of the gas consumers had availed themselves of the advantages the Commissioners offered, and that these belonged to the portions of the community who were able, and, from the memorialists' experience, were, in the majority of cases, willing, to pay a reasonable price for the work done. They submitted, further, that the principle of executing work free of charge, and in having the deficiency made good from the price of the gas, was economically unsound, it being an axiom in business that each department should make no loss. In this case, it followed that the whole body of the gas consumers paid a higher price for their gas than would be necessary if the work referred to were paid for directly by the parties benefited. Admitting that if a large proportion of consumers availed themselves of the privileges of the use of gas fires and cookers, and the cost of producing gas was thereby slightly reduced, the loss involved in executing the work gratuitously would still be almost as large in proportion. The memorialists sympathized with the desire of the Commissioners to develop the use of gas as a heating and lighting agent, and were ready and willing to do all in their power to co-operate with them in the attainment of that object; and while it might not be strictly within their province to make suggestions, they would be glad to see the Commissioners adopt a system which would enable private traders to supply the appliances and to execute the work. They therefore begged the Commissioners to consider the question of appointing a Committee to meet with a Committee of traders, for the devising of a scheme whereby this result might be attained. At the meeting of the Commissioners on Monday a deputation of traders was present. Lord Provost Sir Robert Cranston declined to discuss the subject then. They had, he said, fixed the 10th of October as the day on which they would hear the traders. Mr. A. Gilchrist, who was the spokesman for the deputation, said they believed that the delay would be somewhat disastrous to their cause. The Lord Provost offered another date about that time, but said they could not make the meeting much earlier, because they required time to procure the data upon which they were to proceed. The deputation therefore accepted the 10th of October; and having thanked the Lord Provost for his courtesy, withdrew. After they had gone, Mr. W. F. Stewart asked if the report which Mr. Herring was preparing on the subject would be printed and circulated before the above-named date. Mr. Herring said it would be ready by then.

Sir Robert Cranston referred to the death of his predecessor, Sir James Steel, from whose knowledge and advice the Commissioners had greatly benefited; and on his proposal it was agreed to transmit to Lady Steel their heartfelt sympathy with her in the circumstances, and to tender to her their thanks for the services her husband had rendered to the Commissioners.

Last week it was reported to the Corporation of Greenock by the Gas Committee that discussion had taken place at one of their meetings upon the items on which, in actual working, the estimates had not been realized—tar, coke and breeze, ammoniacal liquor, and sulphate of ammonia—and that it was left with the Convener to have a statement placed before the members showing where the results of the year's working exceeded or fell short of the estimates, and giving reasons for the same. A letter was read from the Manager, in reference to statements made at the previous meeting of the Corporation, asking permission to reply to them in writing, and the Town Clerk was instructed to write to Mr. Ewing to lodge his reply with him. At another meeting of the Committee, the estimates for the current year were discussed. It was agreed that the price of gas remain the same as last year; and it was proposed to draw on the reserve fund started last year to clear off the deficit upon that year's working. The balance-sheet of the undertaking for the year ending June 30 showed that the revenue amounted £48,509, and the expenditure to £39,727, which left a balance of £8782. But as £9170 was required for the payment of sinking fund charges and interest, there was a deficit on the year's working of £388. In the Town Council, Mr. J. M'Onie, the Convener of the Gas Committee, said they would find, from the monthly report, that the wages they were paying were nearly the same as they paid at this time last year. It was fair to say that while the wages sheet was about as big as it was at the same time last year, there had been large increases in the gas and the residuals produced, and, of course, there had been a corresponding increase in the quantity of coal used. It would be seen that for rates and taxes, excluding property and income-tax, they paid last year £2141, which was £441 more than was estimated for. Maintenance of works and manufacturing plant, wages, and material last year cost them £2660. This year the sum was considerably exceeded in the original estimate. He and the vice-Convener interviewed the Manager upon the subject, and, after considerable pressure, got him to reduce this item to £2540. It was believed by the citizens that in the year before last they had a surplus of over £4000 on the gas undertaking, and that last year there

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was a deficit of £400. This was quite correct; but people forgot that last year they paid only 2s. 9d. per 1000 cubic feet for their gas, and that in the former year they paid 3s. 2d. The Council approved of the estimates which the Committee had placed before them.

The Trades Council of Dundee having failed to get the Lord Provost of the City to call a public meeting, have done so themselves, "to consider recent actions of the Town Council—more particularly in reference to the granting of a retiring allowance of £250 per annum to a highly-paid city official, in comparison with the treatment meted out to old and faithful servants in the Dundee Gas-Works, the non-observance of the fair wage clause in Corporation contracts," &c. Members of the Town Council have been specially invited to the meeting, which is to be held on the evening of the 13th of October.

The Banchory Gaslight Company realized a profit of £210 upon their working during the past year. They have placed £50 to depreciation fund, and paid the customary dividend of 1s. per share. The year was the most successful the Company have ever had, the reason for which is said to have been a considerable increase in the consumption of gas and decrease in the loss by leakage.

Mr. Robertson, the Burgh Treasurer of Falkirk, at a special meeting of the Town Council on Wednesday, submitted his annual budget relative to the burgh finances. Dealing with the Gas Department, he said that during the year there was a capital expenditure of £1772, which was principally incurred in the extension of mains and in the purchase of new meters. The revenue account showed an income of £24,922, and an expenditure of £18,962. The gross profit was £5960. Out of this, there was paid interest and contribution to sinking fund, a sum of £1000 has been placed to reserve fund, which now amounts to £3000, and £1629 has been carried forward. The Council let the contract for the erection of the retort-bench in the new gas-works to Messrs. R. Dempster and Sons, Limited, of Elland, subject to the Manager—Mr. W. M'Crae—being satisfied on seeing similar settings at work in Derby. The contract for the steel-work of the purifier house was let to the Barrowfield Iron-Works, Limited, of Glasgow.

Mr. Williamson, the Treasurer to the Gas Commissioners of Peebles, reported to the Town Council on Thursday, that the revenue from the sale of gas last year amounted to £4321, from residuals to £739, and from other sources, such as cooker rental and old material sold, to £150. With several other small items, the total revenue was £5226. The expenditure on the manufacture of gas was £3326, and on distribution £96; other items bringing up the total to £5104. There was thus a balance of £122. The quantity of gas made amounted to 28,560,200 cubic feet—an increase over the previous year of 1,741,200 cubic feet. This was a very considerable increase, when they considered how often the pressure of the gas had to be taken off owing to inability to make the quantity required by consumers. The cost of the manufacture of gas per 1000 cubic feet had been 3s. 7d., of which coal cost 1s. 7½d. They sold 26,263,900 cubic feet of gas; and the cost per 1000 cubic feet sold amounted to 3s. 10⅝d.; but from cooker rentals and other sources they had received £800, which was equal to 8⅛d. per 1000 cubic feet sold, which reduced the net cost of gas to 3s. 2½d. per 1000 cubic feet sold. The capital expenditure last year was £2122; but before this year is out, it will be nearly £20,000. There were now 938 cooking appliances in use in the town, twelve gas-engines, 423 ordinary meters, 18 special-price meters, and 873 prepayment meters—a total of 1314, or an increase of over 400 since the works were taken over. Their officials were wearying for the completion of the new gas-works, in order that they might have another exhibition of gas appliances, and have another boom such as they had on a former occasion. Provost Ballantyne, in proposing a vote of thanks to Mr. Williamson, said that, although the surplus was small, the gas account had come out on the right side. They were selling the gas very cheap; and he thought they had reason to conclude that the gas undertaking was a success. In reply to a question as to when the new works would be completed, Mr. A. Bell, jun., the Manager, said he expected to be making gas in them in the early spring of next year. The accounts were adopted. They show a prosperity which is truly marvellous.

The Town Council of Kilsyth last week opened an extension to the town water-works, which has been under consideration, or in process of construction, during the past sixteen years. The principal part of the work has been the building of a reservoir at Corrie. This covers twelve acres of land, and contains 34 million gallons of water. There is now a supply, at the rate of 40 gallons per head of the population per day, for 140 days, and for a provision of 100,000 gallons per day of compensation water.

Last week new water-works for the town of Hamilton were formally opened by Provost Keith, who turned on the water at the reservoir at Kype. The new works are the third extension of the water supply in thirty years. They have cost about £70,000, and will enable the Corporation to draw 1,500,000 gallons per day from the stream, and to provide 750,000 gallons daily for compensation. There is, however, sufficient water in the stream to allow the quantity taken to be increased to 4 million gallons daily, and the compensation water to 2 million gallons.

CURRENT SALES OF GAS PRODUCTS.

LIVERPOOL, *Oct.* 1.

Sulphate of Ammonia.

Throughout the week there has been a steady demand, and prices show a further slight improvement; the closing quotations being £11 16s. 3d. per ton f.o.b. Hull, and £12 per ton f.o.b. Liverpool and Leith. The Continental market alone remains indifferent; and this notwithstanding the hardening tendency of nitrate of soda. For October-December delivery, makers quote £12 5s. per ton f.o.b.; but this appears to be above the ideas of buyers. For January-March and January-June, £12 10s. per ton f.o.b. Leith is generally required; but buyers still hesitate to pay the price. It may be noted, however, that

THE
MAXIM PATENT CARBURETTOR
FOR ENRICHING GAS IN BULK.
PREVENTS NAPHTHALENE DEPOSITS.
OVER 120 MAXIM PATENT CARBURETTORS HAVE NOW BEEN FIXED.
Among the Companies and Towns supplied are The Gaslight and Coke Company, The South Metropolitan Gas Company, Birmingham, Leeds, Rochdale, Bristol, Sheffield, Oldham, Dundee, Perth, Dunfermline, and many other Works, both large and small, where they have been working in some instances for the past Ten Years.
MORE GAS & SALEABLE COKE PER TON of COAL CARBONIZED is PRODUCED; SAVING CAPITAL, LABOUR, FUEL, WEAR & TEAR, &c.
THE ENRICHMENT IS INSTANTANEOUS AND PERMANENT.
The Carburettor is inexpensive, easily fixed, and entirely supersedes the use of Cannel.
Dealers in Benzol, Carburine, and all other Naphthas and Oils suitable for the Enrichment or Production of Gas.
For Prices and full Particulars, apply to
THE GAS LIGHTING IMPROVEMENT COMPANY, LIMITED,
18, DEVONSHIRE STREET, BISHOPSGATE, LONDON, E.C.

speculators are becoming shy about offering abroad at a discount on makers' prices, and that their attention is being directed more to "covering" outstanding contracts.

Nitrate of Soda.

This article is firm in all positions, and spot prices have been advanced to 10s. 3d. and 10s. 6d. per cwt., for ordinary and refined qualities respectively. In the forward position, there has been an improvement of about 1½d. per cwt.

LONDON, *Sept.* 30.

Tar Products.

There has certainly been a slightly improved demand all round, although prices, as a rule, do not show much sign of improvement. The position of pitch remains unchanged. Continental consumers report purchases at very low prices; and although they are willing to contract all over next year, they are offering even lower figures than those at present ruling. In South Wales, there are inquiries for delivery all over 1905; but consumers appear to consider they should be able to purchase at a reduction on existing values. Yorkshire and Midland pitch are still both in good demand, especially for early delivery; but as regards forward, it is very difficult indeed to fix actual values all over next year. There is more business doing in benzol, and sales are reported in 90 per cent. in London at 9¼d. to 9½d. per gallon for prompt delivery; while distillers are now declining to quote forward. In 50-90 per cent., there has also been considerable business done in the North at prices varying from 7d. to 7½d., according to position. There is nothing fresh to advise in anthracene. Business is limited to small parcels of "A" quality for prompt, as consumers do not seem inclined to advance their offers for forward delivery. Solvent naphtha continues in good demand; and so far as home consumption is concerned, there certainly appears to be more inquiry. There is not, however, very much doing for export, although makers in the North of England appear to be firm in their ideas. There has been quite a spurt in carbolic acid; and after 1s. 10d. and 1s. 11d. had been paid, a large business was done at 2s. per gallon for 60's, both in London and the Provinces. The bulk of the sales made have been for October-December delivery; but in more than one instance contracts have been passed for December-January at about this price. Makers do not now seem inclined to sell, except at a further advance, and it remains to be seen whether consumers will respond promptly to a still further improvement in value. It is very difficult indeed to fix prices of crystals, as it is reported that most of the offers have now been withdrawn, and English makers have certainly advanced their quotations. The market in creosote is decidedly dull, and business has been done in the North at lower prices, especially for early delivery. It would appear that one or two makers were very anxious to sell for October-December delivery, and have accepted lower prices in more than one instance. In London also the demand is certainly not so good, and several small parcels have been offered at rather lower quotations than those ruling a few days ago.

The average values during the week were: Tar, 17s. to 20s. 6d.; pitch, London, 27s. to 27s. 6d.; east coast, 27s.; west coast, 25s. 6d. to 26s. Benzol, 90 per cent., 9¼d. to 9½d.; 50-90 per cent., 7d. to 7¼d. Toluol, 6¼d. to 6⅜d. Crude naphtha, 2⅝d. to 3d.; solvent naphtha, 8d. to 8½d.; heavy naphtha, 10d. to 10⅛d. Creosote, London, 1 9/16d. to 1⅝d.; North, 1¼d. to 1⅜d. Heavy oils, 2d. to 2 1/16d. Carbolic acid. 60 per cent., 2s. Refined naphthalene, £4 10s. to £8; salts, 20s. 6d. to 22s. Anthracene, "A" quality, 1¾d. to 2d.; "B" quality, 1d., nominal.

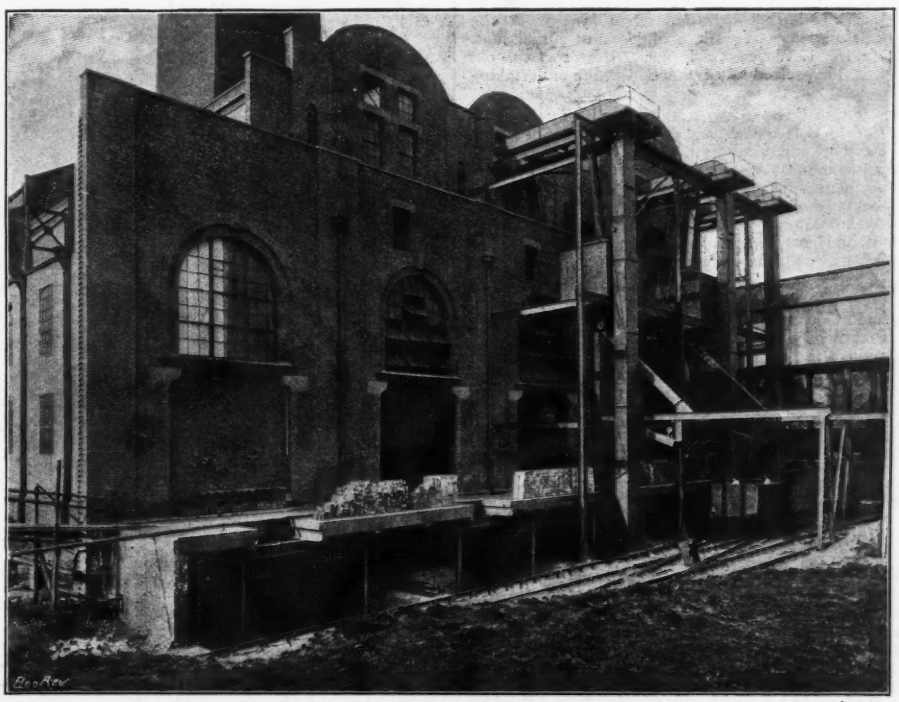
Sulphate of Ammonia.

The market is decidedly firm, and there is a very good demand, especially for forward delivery. Beckton quote £12 for October, but ask £12 2s. 6d. for November-December. South Metropolitan are not sellers for October, and quote £12 2s. 6d. on their own special terms for November-December. Business at Leith is reported as high as £12 for prompt; whilst £12 2s. 6d. has been paid for October-December. In Hull business has been done at £11 17s. 6d. for prompt; while it is reported that £12 2s. 6d. has been paid for October-March. The market closes decidedly firm; and it seems probable that prices will be well maintained for some time to come.

COAL TRADE REPORTS.

Lancashire Coal Trade.

Taken all round, the position of the coal trade is firmer than last week. More house coal and more coke for domestic purposes is going out to villa residents, and retailers and merchants are increasing their stocks. Coal for shipping is better sought after. Engine fuel moves away steadily, owing chiefly to full time being worked in the cotton mills. Certain contracts just expired have been renewed for the next six months on the same terms. There is little doing in cannel; but the deliveries under existing contracts are increasing. Forge and steam coal is in moderate request. The operative miners' representative, Mr. Thomas Ashton, says things are undoubtedly improving on the whole in the coal trade; and for the county of Lancashire four-and-a-half days per week are the average working days. Neither employers nor miners, he says, care to work on Saturday. He also states that there is only one serious dispute in the county—viz., at Tyldesley, where a strike of 500 or 600 miners is threatened. This may, however, yet be averted. The Scotch trouble, he added, was likely to blow over; and the time was probably not far distant when the whole of the miners in the United Kingdom would be under one Conciliation Board. Quotations remain without material change—viz., Best house coal 13s. to 14s. per ton at the pit, secondary 11s. to 12s., and common 9s. to 10s.; steam and forge coal 7s. 6d. to 7s. 9d. for common, and from 8s. to 8s. 6d. for the better qualities. Best slack is firm at 6s. to 6s. 6d., secondary 5s. to 5s. 6d., and common 4s. to 4s. 6d.



THREE CONVEYORS ON A LARGE COAL STORAGE PLANT

ERECTED BY

NEW CONVEYOR CO., LTD., SMETHWICK.

Northern Coal Trade.

There is a rather firmer tone in some branches of the Northern coal trade. The output has been slightly reduced; and this temporary reduction has eased the market. For best Northumbrian steam coals, the current quotation is from 9s. to 9s. 1½d. per ton f.o.b., second-class steam coals are 8s. 3d., and steam smalls are firm at from 4s. to 4s. 3d. There is a fair demand; and the collieries are now working more fully. The Durham coal trade shows some improvement in the demand; but there is an ample supply so far. In the gas coal trade, the consumption is now appreciably increasing, and will do so for some time to come. There is less of the best gas coal for casual sale after the contracts have been met; but some of the foreign contracts are now running on towards expiry. Prices of Durham gas coals vary from about 7s. 10d. to 8s. 6d. per ton f.o.b., according to quality. No large additional contracts are reported this week. Coke is rather quieter; and with a heavier production gas coke is easier at the inland works, though on Tyneside about 13s. per ton f.o.b. is still the current quotation for good qualities.

Scotch Coal Trade.

The market shows almost no change. The demand continues good, and prices are steady; the tendency being, if anything, towards improvement. The quotations are: Main 7s. 3d. to 7s. 6d., per ton f.o.b. Glasgow, ell 8s. 3d. to 9s. 3d., and splint 8s. 6d. to 9s. The shipments for the week amounted to 232,345 tons—a decrease of 35,851 tons upon the preceding week, but an increase of 8228 tons upon the corresponding week of last year. For the year to date, the total shipments have been 8,321,150 tons, an increase of 157,479 tons upon the corresponding period.

Spontaneous Combustion of Coal.—A case of spontaneous combustion occurred a few days ago in the coal-store at the Beccles Gas-Works. The store adjoins the retort-house, and holds about 400 tons. Fortunately the fire was located after the removal of about 60 tons of coal.

The D'Heureuse Mantle.—We learn from the General Manager of the Welsbach Company, Mr. L'ce Fletcher, that the Company have acquired the English patent rights in the D'Heureuse mantle. This mantle, which differs from others in that the fabric is woven instead of knitted, was fully described and illustrated in the "JOURNAL" for Dec. 22 last, in the course of our notice of the Gas Exhibition at the Crystal Palace.

Gas and Water Works Extensions for Abergavenny.—At a meeting of the Abergavenny Town Council on Wednesday, it was resolved that application should be made for a Provisional Order for the extension of the gas and water works. The Gas Committee's recommendation that the standard of illuminating power for the whole of the gas manufactured should be reduced to 12 candles (which, they said, was ample where the incandescent system was in use) was adopted.

Extension of the Torpoint Gas-Works.—Owing to the rapid growth of Torpoint, an extension of the gas-works has become necessary. A new holder is being erected, and the mains are about to be extended to new streets which have been built within the last few years. At the annual meeting of the Company last week, a dividend of 2½ per cent. was declared; and Mr. W. J. Waycott, a former Director of the old Devonport Gas Company, expressed the opinion that the undertaking would have a good future.

Leamington Priors Gas Company.—At the meeting of the Leamington Priors Gas Company last week, dividends at the rate of 10 per cent. per annum on the "A" shares and 7 per cent. on the "B" and "C" shares (all less income-tax) were declared. The report stated that there had been an increase of 4½ per cent. in the sales of gas, due chiefly to the 1200 cooking-stoves out on hire. The Chairman (Mr. E. Wright) reported that the new cyanogen plant had been working for a year; and though it had cost something under £1000, the amount received in cash for cyanogen had already been £176.

Gas Supply in the Clayton West District.—The Urban District Council of Clayton West have accepted the tender of the proprietor of the gas-works (Mr. A. F. Goodson) for public lighting. Since acquiring the works on the 1st of July last, the consumption of gas, notwithstanding the competition of the electric light, has been almost trebled; and very recently another populous portion of the neighbourhood has been added to the area of supply. Mr. Goodson has now opened negotiations with the adjoining township of Emley, with a view to adding this to his district; and in the event of their proving successful, the work of connecting the two places (2½ miles apart) will be immediately pushed on with the utmost rapidity. In consequence of the enterprise shown in stimulating the sale of gas, the purveyors of oil have reduced its price 2d. per gallon.

Theft from a Prepayment Meter.—At the Blyth Police Court, on Monday, the 26th of September, James Rowley, labourer, residing at Cowpen Quay, Blyth, was charged with breaking open the gas-meter in his sister's house, and stealing therefrom the sum of 2s. 3d., the property of the Blyth and Cowpen Gas Company. Mrs. Morton, sister of the accused, stated that on the previous Wednesday her brother came to her house, and, on his requesting her to go to see their mother on some business, she left him in the place. On returning, she found the lock wrenched off the money-box of the meter and lying on the floor. She accused her brother of having done the damage; but he denied it. She, however, gave information to the police, and Rowley was in consequence arrested and charged with the offence. John S. Armstrong, meter inspector to the Company, stated that he went to the house in question on the 22nd ult., and found that since his visit on the 16th of July the sum of 2s. 3d. had been deposited in the meter. He added that the lock had been broken off, and the sum stated, which represented 600 cubic feet of gas burnt, was missing. A police constable spoke to arresting the defendant, and charging him with stealing 5s. from the meter. Rowley replied that it was not 5s., but only 2s. 3d.; thereby admitting the theft. He pleaded guilty to the charge, and urged drunkenness as the cause of his position. He was sentenced to one month's imprisonment, with hard labour.

PARKINSON'S

GAS-FIRES.

The "INSET."

PARKINSON AND W. & B. COWAN, LTD.
(*Parkinson Branch*),
COTTAGE LANE, CITY ROAD, LONDON.
BELL BARN ROAD, BIRMINGHAM.

Reduction in Price at Leatherhead.—The Leatherhead Gas Company intimate that from the end of the Michaelmas quarter the charge for gas to ordinary consumers is reduced from 4s. to 3s. 10d. per 1000 cubic feet.

Disturbance of Streets by a Gas Company.—Complaint was made by the Surveyor to the Crediton Urban District Council, at the meeting of that body last week, of the state in which the footpaths were left after the laying of new pipes by the Gas Company. He thought the Company should be called upon to put the paths in a satisfactory condition. The Chairman (Mr. W. B. Berry) suggested that the Surveyor should be empowered to take action in the matter. It was, however, decided that the Clerk should write to the Company and request them to do what was necessary. Another complaint by the Surveyor was that there was an escape of gas in North Street—a part of the town where new sewers had been laid, and where the road was about to be repaired. The Gas Company's attention had been called to the matter, and the mains had been tested without any leakage being detected. What he feared was that when the road had been put in proper condition further complaints as to the smell of gas would lead to the roadway being again broken up. His own opinion was that the main in North Street was in a bad state. It was ultimately decided to call the Company's attention to the street work which was about to be done, and ask them to discover and remedy the leakage before the work was commenced.

The Proposed Incandescent Lighting of Bath Streets.—The proposal to improve the lighting of the streets at Bath by converting the present gas-lamps from the flat-flame to the incandescent system makes only slow progress. At the last meeting of the Surveying Committee of the City Council, the Lighting Sub-Committee presented a report which recommended that 178 of the lamps should be altered at an additional cost of £80 a year. It was explained that this was part of a scheme for the use of incandescent burners in the whole of the streets now lighted by gas, and that the total annual addition to the cost of lighting would be £400. The Lighting Committee did not think it wise to recommend all this increased expenditure at one time, and proposed to take three years to make the alteration. Objection was offered to the scheme on the ground of its expense; and it was suggested that information as to the cost of incandescent lighting should be obtained from Bristol and elsewhere. It was decided to defer the matter until further inquiries had been made. In the meantime, complaint is being made in the local papers of the indifferent lighting of the suburban streets, and comparison is made between these and the central thoroughfares, on which the Corporation spend liberally for electric light. A recent correspondent objecting to the manner in which the Lighting Committee treated the matter, pointed out that residents in the suburbs have to contribute to the extra expense of the superior illumination of the city, and yet have themselves to put up with bad lighting in their own districts.

West's Gas Improvement Company, Limited, have received an order for further compressed-air machines for the Old Kent Road Works of the South Metropolitan Gas Company.

Messrs. Clapham Bros., Limited, of Keighley, have received an order from the South Suburban Gas Company for the supply of cast and wrought iron and steelwork required for eight benches of ten retorts.

The Chemical Engineering Company and Wilton's Patent Furnace Company have received an order, through Messrs. Corbet Woodall and Son, for the supply and erection of a complete sulphate of ammonia plant at the Winchester Gas-Works.

The Richmond Gas Stove and Meter Company, Limited, recently held the half-yearly conference of their representatives at the London offices. Mr. Thornton presided. The same evening, a dinner was given to the representatives by the Company, at which a presentation of a gold watch chain was made to Mr. J. W. Slack, the Secretary.

As will be seen from an advertisement appearing in to-day's issue, the Directors of the Buenos Ayres (New) Gas Company, Limited, have declared an interim dividend at the rate of 6 per cent. per annum, free of income-tax, for the six months ending June 30, payable on and after the 0th inst. The transfer books will be closed from the 7th to the 20th inst., both days inclusive.

At a meeting of the Scarborough Water Committee yesterday week, the Engineer (Mr. W. Millhouse) reported that on the previous Saturday morning, the 13-inch main supplying the town from the lower reservoir on Oliver's Mount burst, and allowed 750,000 gallons to run to waste before the water was shut off. The town supply, however, was kept going, though at a somewhat reduced pressure.

At the opening last week of the new Seacroft Fever Hospital, at Leeds, the Architect (Mr. E. T. Hall) mentioned, as indicating the magnitude of the work, that there are within its bounds 26 miles of steam, water, and other pipes, and 60 miles of electric cables. With a view to obviating any risk of lead poisoning through the water supply, Walker's patent "Health" water-pipes (which are made of iron, lined with pure block tin) have been employed throughout the hospital.

At the meeting last Wednesday of the East Ham Urban District Council, the Surveyor reported that the Gaslight and Coke Company were willing to surrender, free of cost, a strip of their land, between the North Metropolitan sewer embankment and the Beckton level crossing, about 300 yards long and varying from 5 to 15 feet in width, for the improvement of High Street South. The offer was accepted, and the thanks of the Council were voted to the Company for their action in the matter.

An inquiry on behalf of the Local Government Board was held at Caistor recently by Mr. A. Ducat regarding an application of the Rural District Council for leave to borrow £1500 for the purpose of carrying out a water scheme. It was stated that a trial boring had resulted in the finding of an efficient supply of excellent water. There was some slight opposition offered; one ratepayer stating that he had no objection to a proper supply of water being provided, but he was opposed to that particular scheme.

The "MAIN"

Gas Cooker

WITH LATEST DEVELOPMENTS.

SPECIAL FEATURES.

OUR NEW PATENT ENAMEL is guaranteed free from Lead or other Poisonous Chemicals.

Inside Fittings, Porcelain Enamelled.

Can be supplied with Moveable Burners, if desired.

R. & A. MAIN, LTD.,

LONDON: 49, Queen Victoria Street. | GLASGOW: 26, West Nile Street. | FALKIRK: Gothic Works.

WANTED, FOR SALE, CONTRACT, &c., ADVERTISEMENTS IN THIS WEEK'S "JOURNAL."

Situations Vacant.
ENGINEER AND MANAGER. Padiham Gas Department. Applications by Oct. 31.
SECRETARY AND MANAGER. Raunds Gas Company.

Agency Wanted (Pipes, &c.). No. 4273.

Situations Wanted.
LIGHTING ENGINEER AND MANAGER. No. 4274.
SUPERINTENDENT Distribution Department. No. 4271.

Capital Wanted. No. 4272.

Plant, &c., For Sale.
HIGH-POWER LAMPS. Stamford and St. Martins Gas Company.

Company Meeting.
DANISH GAS COMPANY. London Offices, Oct. 27. Two o'clock.

TENDERS FOR

Benzol.
HEYWOOD GAS DEPARTMENT. Tenders by Oct. 18.

Coke.
RAMSGATE GAS DEPARTMENT. Tenders by Oct. 8.

Fire-Clay Goods.
ROCHESTER, CHATHAM, AND STROOD GAS COMPANY. Tenders by Oct. 10.
ROTHERHAM GAS DEPARTMENT. Tenders by Oct. 17.

Tenders for—(*Continued.*)

Oxide (New and Spent).
LEEK GAS DEPARTMENT. Tenders by Oct. 10.
SALFORD GAS DEPARTMENT. Tenders by Oct. 13.

Pipes, &c.
RAMSGATE GAS AND WATER DEPARTMENT. Tenders by Oct. 8.

Stocks and Shares.
BARNET GAS AND WATER COMPANY. Oct. 25.
BRISTOL WATER COMPANY. Oct. 18.
CROYDON GAS COMPANY. Nov. 1.
LOWESTOFT WATER AND GAS COMPANY. Oct. 25.
SOUTH ESSEX WATER COMPANY. Oct. 25.
SOUTHEND WATER COMPANY. Oct. 18.

GAS COMPANIES' STOCK AND SHARE LIST.

Referred to on p. 27.

Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.	Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p.c.				£ s. d.	£			p.c.				£ s. d.
500,000	10	Apl. 14	10½	Alliance & Dublin 10 p.c.	20—21	..	5 0 0	75,000	5	June 29	5	Malta & Medn., Ltd. .	4¼—4⅜	..	5 5 3
100,000	10	,,	7½	Do. 7 p.c.	13¼—14½	..	5 3 5	560,000	100	Oct. 1	5	Met. of 5 p.c. Deb..	101—103*	..	4 17 1
200,000	5	May 12	6½	Bombay, Ltd.. . .	6⅛—6⅜	..	4 16 4	250,000	100	,,	4½	Melbourne 4½ p.c. Deb.	98—100*	..	4 10 0
140,000	5	,,	6½	Do. New, £4 paid	4⅜—5⅛	..	4 18 11	541,920	20	May 27	3½	Monte Video, Ltd. . .	10⅝—11⅛	+⅛	6 1 9
50,000	10	Aug. 31	14	Bourne- mouth Gas and Water 10 p.c. Pref. 6 p.c.	28—29	..	4 16 7	1,515,892	Stk.	July 29	4½	Newc'tle & G'tesh'd Con.	104⅜—105	..	4 5 9
251,810	10	,,	7		14¼—15½	..	4 10 4	406,125	Stk.	July 1	3½	Do. 3½ p.c. Deb.	92—92½	..	3 15 8
53,200	10	,,	6		14—15	..	4 0 0	15,000	10	Aug. 31	10	North Middlesex 10 p.c.	19—20	..	5 0 0
380,000	Stk.	Aug. 12	12	Brentford Consolidated	235- 240	..	5 0 0	52,940	10	,,	7	Do. 7 p.c.	13—14	..	5 0 0
300,000	,,	,,	9	Do. New . . .	178—183	..	4 18 4	300,000	Stk.	May 12	8	Oriental, Ltd. . . .	140—145	..	5 10 4
50,000	,,	,,	5	Do. 5 p.c. Pref. .	125—130	..	3 16 11	600,000	5	Sept. 15	7	Ottoman, Ltd. . . .	5⅛—6⅛	..	5 12 0
206,250	,,	June 10	4	Do. 4 p.c. Deb. .	102—105	..	3 16 2	235,005	Stk.	—	6⅛	Plym'th & St'house 5 p.c.	—	..	—
220,000	Stk.	Sept. 15	11	Brighton & Hove Orig.	207—212	..	5 3 9	398,490	5	Apl. 28	5	Primitiva Ord. . . .	4⅜—5⅛	..	4 15 3
246,320	,,	,,	8	Do. A. Ord. Stk. .	146—151	..	5 6 0	796,980	5	July 28	5	Do. 5 p.c. Pref. .	4¼—4⅜	..	5 5 3
400,000	20	Sept. 29	10	British	38⅜—39½*	..	5 1 3	492,200	100	June 1	4	Do. 4 p.c. Deb. .	93—95	+1	4 4 3
100,000	Stk.	Aug. 12	6	Bromley, Ord. 5 p.c. .	114—118	..	5 1 9	851,070	10	Apl. 28	7	River Plate Ord. . . .	11⅝—12	+⅛	5 16 8
165,700	,,	,,	4½	Do. do. 3½ p.c. .	88—93	..	4 16 9	300,000	Stk.	June 29	4	Do. 4 p.c. Deb. .	93—95	..	4 4 3
500,000	10	May 12	7	Buenos Ayres (New) Ltd.	11⅜—12	+⅛	5 16 8	250,000	10	Sept. 15	6	San Paulo, Ltd. . . .	11—12	..	5 0 0
250,000	Stk.	June 29	4	Do. 4 p.c. Deb. .	92—94	..	4 5 1	70,000	50	June 29	5	Do. 5 p.c. Deb. .	49—51	..	4 18 0
150,000	20	July 14	8½	Cagliari, Ltd.	22—24	..	6 17 6	135,000	Stk.	Mar. 10	10	Sheffield A	237—239	..	4 3 8
100,000	10	Sept. 29	10	Cape Town & Dis., Ltd.	13⅜—14⅜*	..	6 17 11	209,984	,,	,,	10	Do. B	23⅝—238	..	4 4 0
100,000	10	Apl. 28	4½	Do. 4½ p.c Pref.. .	91—93	..	4 12 4	523,498	,,	,,	10	Do. C	234—236	..	4 4 9
50,000	50	May 3	6	Do. 6 p.c. 1st Mort.	51—53	..	5 13 2	123,998	Stk.	Sept. 29	5	Shrewsbury Ord. 5 p.c.	107—110*	..	4 10 11
50,000	Stk.	June 29	4½	Do. 4½ p.c. Deb. Stk	98—100	..	4 10 0	70,000	10	,,	11	South African	15—16*	..	6 17 6
1,375,000	Stk	Aug. 31	5⅛	Commercial 4 p c Stk. .	108—112	..	4 12 10	6,250,000	Stk.	Aug. 12	5½	South Met., 4 p.c. Ord.	125—127	..	4 6 8
560,000	,,	,,	5	Do. 3½ p.c. do. .	104—107	..	4 13 6	1,832,700	,,	July 14	3	Do. 3 p.c. Deb.	87—89	..	3 7 5
450,000	,,	June 10	3	Do. 3 p.c. Deb. Stk.	84—86	..	3 9 9	575,000	Stk.	Aug. 31	5½	S'th Suburb'n Ord. 5 p.c.	115—120	..	4 11 8
800,000	Stk.	June 10	6	Continental Union, Ltd.	102—107	..	5 12 2	60,000	,,	,,	5	Do. 5 p.c. Pref. . .	118—123	..	4 1 4
200,000	,,	,,	7	Do. 7 p c. Pref.	135—140	..	5 0 0	112,533	,,	July 14	5	Do. 5 p.c. Deb. Stk.	133—138	..	3 12 6
486,690	10	July 14	11	European, Ltd. . . .	19¼—20⅜	..	5 7 4	380,940	Stk.	May 12	5	Southampton Ord. . .	105—110	..	4 10 11
354,060	10	,,	11	Do. £7 10s. paid	13½—14½	..	5 13 9	87,950	,,	—	4	Do. 4 p.c. Deb.	—	..	—
15,243,200	Stk.	Aug. 12	4⅛	Gas- light and Coke 4 p.c. Ord. . .	94—96	+1	4 11 10	120,000	Stk.	Aug. 31	6½	Tottenham and Edmonton A 5 p.c. .	118—123	..	5 1 8
2,600,000	,,	,,	3⅜	3½ p.c. max. . .	87—89	..	3 18 8	325,520	,,	,,	4¾	B 3½ p.c. .	95—100	..	4 15 0
3,709,735	,,	,,	4	4 p.c. Con. Pref.	107—110	..	3 12 9								
4,193,975	,,	June 29	3	3 p.c Con. Deb.	87—89	..	3 7 5	182,380	10	June 10	8	Tuscan, Ltd.	8¼—8⅜	..	9 2 10
258,740	Stk.	Sept. 15	5	Hastings & St. L. 3½ p.c.	90—95	..	5 5 3	149,900	10	July 1	5	Do. 5 p.c. Deb. Red.	96— 8	..	5 2 0
70,000	10	Sept. 29	11	Hongkong & China, Ltd.	15—16*	..	6 17 6	30,000	Stk.	Aug. 31	7⅜	Wands- worth and Putney A 5 p.c. . .	150— 55	..	5 0 0
3,800,000	Stk,	May 12	10	Imperial Continental .	204—207	+3	4 16 7	255,636	,,	,,	6⅛	B 3½ p.c. . .	120—125	..	5 0 0
473,600	Stk.	Aug. 12	3⅜	Do. 3½ p.c. Deb. Red.	95—98	..	3 11 4	50,000	,,	,,	5 17/20	C 3½ p.c. . .	102—107	..	4 18 2
175,036	Stk.	Aug. 31	6	Lea Bridge Ord. 5 p.c. .	115—120	+3	5 0 0	59,416	,,	June 29	3	3 p.c. Deb. Stk.	78—83	..	3 12 8
561,000	Stk.	Aug. 31	10	Liverpool United A . .	218—220	..	4 10 11	745,872	,,	Aug. 12	5	West Ham 5 p.c. Ord.	95—100	..	5 0 4
718,100	,,	,,	7	Do. do. B .	156—158	..	4 8 7	85,000	,,	,,	5	Do. 5 p.c. Pref. . .	115—120	..	4 3 4
306,083	,,	June 29	4	Do. do. Deb. Stk.	106—108	..	3 14 1	160,000	,,	June 29	4	Do. 4 p.c. Deb. Stk.	103—108	..	3 14 1

Prices marked * are Ex div.

NOTICES TO CORRESPONDENTS, ADVERTISERS, AND SUBSCRIBERS.

No notice can be taken of anonymous communications. Whatever is intended for insertion in the "JOURNAL" must be authenticated by the name and address of the writer; not necessarily for publication, but as a proof of good faith.

COPY FOR ADVERTISEMENTS for the "JOURNAL" should be received at the Office NOT LATER than TWELVE O'CLOCK NOON ON MONDAY, to ensure insertion in the following day's issue.

Orders for Alterations in, or stoppages of, PERMANENT ADVERTISEMENTS should be received by the FIRST POST on SATURDAY.

Wanted, For Sale, and Tender Advertisements, Six Lines and under, 3s.; each additional Line, 6d.

TERMS OF SUBSCRIPTION to the "JOURNAL."

United Kingdom: One Year, 21s.; Half Year, 10s. 6d.; Quarter, 6s. 6d. Payable in Advance. If credit is taken, the charge is 25s. a year.

Abroad (in the Postal Union): £1 7s. 6d., payable in Advance.

All Communications, Remittances, &c., to be addressed to WALTER KING, 11, BOLT COURT, FLEET STREET, LONDON, E.C.
Telegrams: "GASKING, LONDON." Telephone: P.O. 1571a Central.

OXIDE OF IRON.

O'NEILL'S OXIDE has a larger annual sale than all other Oxides combined.

SPENT OXIDE purchased in any district.

GAS PURIFICATION & CHEMICAL CO., LD.

JOHN WM. O'NEILL, Managing Director,

PALMERSTON HOUSE, LONDON, E.C.

WINKELMANN'S
"VOLCANIC" FIRE CEMENT.
Resists 4500° Fahr. Best for GAS-WORKS.
ANDREW STEPHENSON, 182, Palmerston House, Old Broad Street, London E.C. "Volcanism, London."

SULPHURIC ACID for Sale, specially suitable for making Sulphate of Ammonia.
BROTHERTON AND CO., LTD., Chemical Manufacturers. Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

J. & J. BRADDOCK (Branch of Meters Limited), Globe Meter Works, OLDHAM, and 45 & 47, Westminster Bridge Road, LONDON, S.E.
WET AND DRY GAS-METERS, PREPAYMENT METERS, STATION METERS, AND GOVERNORS.
REPAIRS RECEIVE PROMPT ATTENTION.
Telephones: 254 Oldham, and 2412 HOP, London.
Telegrams:—
"BRADDOCK, OLDHAM," and "METRIQUE, LONDON."

DUTCH OXIDE OF IRON.

THE First Dutch Bog Ore Co., Ltd., (Eerste Hollandsche Yzererts Maaty), ROTTERDAM.
General Manager (for England and Wales)—
CHARLES E. FRY, LEAMINGTON; and at Tower Chambers, Brown Street, MANCHESTER.
London Managers—
E. PADFIELD & CO., 96-98, Leadenhall Street, LONDON, E.C.
General Manager (for Scotland)—
J. B. MACDERMOTT, 11, Bothwell St,, GLASGOW.

OXIDE OF IRON.
(NATURAL.)
BALE & CHURCH will be pleased to send Samples and Quotations, and make Offers for SPENT OXIDE.
BALE'S FIRE CEMENT, PAINT, AND GAS COAL
5, CROOKED LANE, LONDON, E.C.

SULPHURIC ACID.

SPECIALLY prepared for the Manu-facture of SULPHATE OF AMMONIA.
SPENCER, CHAPMAN, AND MESSEL, LIMITED, 36, Mark Lane, LONDON, E.C. Works: SILVERTOWN.
Telegrams: "HYDROCHLORIC, LONDON."
Telephone: 341 AVENUE.

COAL GAS TAR wanted.
ROBINSON BROTHERS, LIMITED. Works: WEST BROMWICH, KNOTTINGLEY, and SPONDON.

BROTHERTON & CO., LIMITED.
Offices: Commercial Buildings, LEEDS. Correspondence invited.

HYDRATED OXIDE OF IRON.
PREPARED from Pure Iron.
Twice as Rich as Bog Ore.
Gives no Back Pressure.
The Cheapest in the Market.
Can be Lent on Hire.
Can be Exchanged for Spent Oxide.
READ HOLLIDAY AND SONS, LTD., HUDDERSFIELD.

TO GAS AND WATER OFFICIALS.
MELROSE CYCLES and Slot Copper COLLECTORS. Latest Design and lowest Prices. For Cash or gradual payments. Catalogue free.
MELROSE CYCLE COMPANY, COVENTRY.

COAL GAS TAR wanted.
BEST PRICES GIVEN.
SHARPNESS CHEMICAL COMPANY, LIMITED, Sharpness Docks, GLOS.

SPECIAL PAINT FOR GAS-WORKS.
JOHN E. WILLIAMS AND CO.,
VICTORIA PAINT WORKS,
MANCHESTER.
Telegrams: "ENAMEL." National Telephone 1759.

JOHN RILEY & SONS, Chemical Manufacturers, Hapton, near Accrington, are MAKERS of Special SULPHURIC ACID, for Sulphate of Ammonia Making. Highest percentage of Sulphate of Ammonia obtained from the use of this Vitriol, which has now been used for upwards of 50 Years. References given to Gas Companies.

ATTERTON'S Patent Charging Machine, especially adapted for Small Works up to 50 Millions. Nearly 40 already supplied, and still supplying. Would soon repay for small outlay. Increased make and reduction in cost.
Apply to E. PADFIELD AND CO., 96 & 98, Leadenhall Street, LONDON, E.C.

PENNY-IN-THE-SLOT WORK.
H. GREENE & SONS, Ltd., are prepared to give QUOTATIONS to Gas Companies or Corporations for FITTING UP COMPLETE and CARRYING OUT the WORK in its entirety, either in Iron or Compo.
SURREY ENGINEERING WORKS, BLACKFRIARS ROAD, LONDON, S.E.
Telephone: 1693 HOP. Telegrams: "LUMINOSITY."

SPENT OXIDE.
THE South Metropolitan Gas Company are always open to receive OFFERS of SPENT OXIDE.
Chief Office: 709, Old Kent Road, London, S.E.
Telegrams: "METROGAS, LONDON."

GAS TAR wanted.
BROTHERTON AND CO., LTD., Tar Distillers.
Works: BIRMINGHAM, GLASGOW, LEEDS, LIVERPOOL, AND WAKEFIELD.

PATENTS AND TRADE MARKS
PUBLICATIONS. "MERCHANDISE MARKS ACT, and Decisions thereunder," 1s.; "TRADE SECRETS v. PATENTS," 6d.; "DOCTRINE of EQUIVALENTS, Mechanical and Chemical," 6d.; SUBJECT-MATTER of PATENTS," 6d.
MEWBURN, ELLIS, & PRYOR, Chartered Patent Agents, 70 and 72, Chancery Lane, London, W.C. Telegrams: "Patent London." Telephone: No. 243 Holborn.

AMMONIACAL LIQUOR wanted.
BROTHERTON AND CO., LTD., Ammonia Distillers.
Works: BIRMINGHAM, GLASGOW, LEEDS, LIVERPOOL, AND WAKEFIELD.

SULPHATE OF AMMONIA
SATURATORS and LEAD WORK for Sulphate of Ammonia Plants.
For REPAIRS or ALTERATIONS ring up "0848 BOLTON," or Telegraph "SATURATORS, BOLTON."
Largest Practice and most Up-to-Date Works in Britain.
JOSEPH TAYLOR AND CO., CENTRAL PLUMBING WORKS, BOLTON.

THE Gas and Water-Works Supplies and Construction Company undertake all Gas and Water Work, Main Laying, &c. Gas and Water Works Financed and Loans Granted. Shares and Stock accepted in part payment for Work and Materials supplied. Gas-Works purchased outright.
Address, 99, CANNON STREET, LONDON, E.C.

OPENING for Small Investment.
Advertiser, established some years as Manufacturers' Agent in London, and holding several good Sole Agencies, requires a small amount of Capital for Extension. Substantial interest is offered, paid quarterly. Excellent Credentials.
Address No. 4272, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

SUPERINTENDENT DISTRIBUTION DEPARTMENT.
WANTED, re-engagement as above.
Practical knowledge of Gas-Fitting in all branches, including Automatic Work. Experienced in the Control of Workmen, Mainlayers, Estimating, Time Sheets, Public Lighting, &c. Highest References.
Address No. 4271, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

ROBERT DEMPSTER & SONS, Ltd.,
Contractors for Complete CARBONIZING PLANTS and every description of GAS APPARATUS and ELEVATING and CONVEYING PLANT, ROSE MOUNT IRON-WORKS, ELLAND.

ENGINEERING Firm, with City Offices and extensive connection among Gas and Water Engineers desire AGENCY for Pipes, Mains, and Foundry Castings.
Address No. 4273, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

LIGHTING Engineer, Incandescent Specialist, Life Experience, wide Connection, seeks Appointment as Engineer, Manager, or Representative. Highest References.
Address No. 4274, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

RAUNDS GASLIGHT AND COKE COMPANY, LIMITED.
SECRETARY AND MANAGER.
THE Directors of this Company require the services of a Practical Man as above. Salary £100 per annum, with House, Gas, and Coals. Make of Gas about 11 Million cubic feet.
Applications, stating Age and previous Experience, to be made in Candidate's own handwriting, to be addressed to Mr. J. GANT, Chairman of the Directors, RAUNDS, Wellingborough.

URBAN DISTRICT COUNCIL OF PADIHAM.
APPOINTMENT OF GAS ENGINEER AND MANAGER.
THE Urban District Council of Padiham invite APPLICATIONS for the post of GAS ENGINEER and MANAGER, at a Salary of £130 per annum, increasing after Two Years to £136 if his services are satisfactory.
The person appointed will have charge of the Council's Gas-Works, and will be required to perform all the duties usually performed by a Gas Engineer and Manager.
The person appointed must devote his whole Time to the duties of his Office.
Applications, stating Age, Experience, and Qualifications, and accompanied by *copies* of not more than Three recent Testimonials, to be sent to me on or before the 31st day of October, 1904, marked "Gas Engineer and Manager."
Canvassing Councillors, either directly or indirectly, will be a disqualification.
JAS. C. WADDINGTON,
Clerk to the Council.
Council Offices, Mill Street,
Padiham, Sept. 28, 1904.

NEW "Cripps" Washer, 8-inch Bye- Pass, in Stock. Will sell cheap.
FIRTH BLAKELEY & CO., Gas Engineers, DEWSBURY.

NEW Gasholder, 40 ft. diameter by 12 ft. deep, with Steel Standards; also new STEEL TANK to contain same.
Write J. WRIGHT, 181, Queen Victoria Street, LONDON, E.C.

CREOSOTE Oil, either Liquid or Salty, to be had in any quantity, either in Tank-Waggons or in Casks for shipment.
Apply, by letter, to No. 4267, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

"DEMPSTER'S" Direct-Acting Re- ciprocating Pumps, Exhausters, and Steam-Engine Combined. Two Sets, 8-inch and 12-inch Connections. Overhauled and Guaranteed. Cheap. Room wanted.
FIRTH BLAKELEY & CO., Gas Engineers, DEWSBURY.

PURIFIERS for Sale.—Set of Four 10- feet square, Planed Joints, Modern Centre Valve, Connections, &c., complete. Re-erected and guaranteed. £280 if sold promptly. Other sizes and plant in Stock.
J. FIRTH BLAKELEY & CO., Gas Engineers, Thornhill, DEWSBURY.

GAS PLANT for Sale—I can always offer NEW and SECOND-HAND GAS APPARATUS, including Retorts and Fittings, Condensers, Exhausters, Scrubbers, Washers, Purifiers, Gasholders, Tanks, Valves, Connections, &c. Also a few COMPLETE WORKS. Compare Prices and Particulars before ordering elsewhere.
J. F. BLAKELEY, Gas Engineer, Thornhill, DEWSBURY.

STAMFORD AND ST. MARTINS GASLIGHT AND COKE COMPANY.
THE above Company have for Sale Two 700-candle power LUCAS LAMPS for exterior lighting. Also One 900-candle power WELSBACH LAMP. All complete with Frogs and in good condition.
Apply, with Offers, to
H. GREEN,
Secretary.
Stamford, Sept. 30, 1904.

BOROUGH OF HEYWOOD.
THE Gas Committee are prepared to receive TENDERS for the supply of BENZOL.
Specification and Form of Tender may be obtained upon application to Mr. W. Whatmough, Gas Manager.
Sealed Tenders, endorsed "Benzol," to be sent to me not later than Tuesday, Oct. 18, 1904.
By order,
GEO. G. BOUCHIER,
Town Clerk.
Municipal Buildings,
Heywood, Sept. 14, 1904.

TAR Contracts Wanted on the Sliding- Scale or at Fixed Prices.
Managers and Secretaries desirous of selling to best advantage, please communicate with DENT AND CO., Ouse Chemical Works, SELBY.

RAMSGATE CORPORATION.
(GAS AND WATER DEPARTMENT.)
THE Committee invite Tenders for the purchase of their surplus COKE from Oct. 1, 1904, to Sept. 30, 1905. Probable quantity, 2000 to 3000 Tons. Delivered free on rail or free into barge, Ramsgate, purchaser paying dues.
Tenders to be sent in not later than Noon on Saturday, Oct. 8, 1904, addressed to the Chairman of the Gas and Water Committee, Boundary Road, Ramsgate, and endorsed "Tender for Coke."
The Committee do not bind themselves to accept the highest or any Tender.
T. N. RITSON,
Engineer and Manager.
Gas and Water Offices,
Boundary Road, Ramsgate.

RAMSGATE CORPORATION.
(GAS AND WATER DEPARTMENT.)
TENDERS are invited for 450 8-inch and 2000 6-inch CAST-IRON WATER-PIPES, in 9 feet lengths, together with about 5 Tons of TEES, BENDS, &c.
Tenders to be sent in, addressed to the Chairman of the Gas and Water Committee, Gas and Water Offices, Boundary Road, Ramsgate, not later than Noon on Saturday, Oct. 8, 1904, endorsed "Tender for Pipes."
Specification and full Particulars on application to the undersigned.
The Committee do not bind themselves to accept the lowest or any Tender.
T. N. RITSON,
Engineer and Manager.
Gas and Water Offices,
Boundary Road, Ramsgate.

ROCHESTER, CHATHAM, AND STROOD GASLIGHT COMPANY.
RETORTS, &c.
THE Directors invite Tenders for the supply of FIRE-CLAY RETORTS, FIRE BRICKS, and CLAY.
Specifications and Form of Tender may be obtained from the undersigned, to whom Tenders, endorsed "Retorts, &c.," must be delivered on or before noon of Monday, October 10, 1904.
J. M. VEEVERS,
Engineer and General Manager.
Gas Offices, Rochester.
Sept. 29, 1904.

COUNTY BOROUGH OF ROTHERHAM.
(GAS DEPARTMENT.)
THE Gas Committee of the above Corporation are prepared to receive TENDERS for the supply and delivery of RETORTS and FIRE-BRICKS as required for the ensuing season.
Tenders to be endorsed "Fire Goods," and sent to the Town Clerk not later than Oct. 17.
Tender Forms and further Particulars may be obtained from the undersigned.
FRANK A. WINSTANLEY,
Engineer and Manager.

LEEK URBAN DISTRICT COUNCIL.
NATURAL OXIDE.
TENDERS are invited for the supply of 75 Tons of NATURAL OXIDE OF IRON for the Purification of Gas. It must be of good quality and delivered carriage paid at the Leek Station on the North Staffordshire Railway.
Tenders, addressed to the Chairman of the Gas Committee, to be delivered before Five o'clock in the afternoon of Monday, the 10th of October, 1904, at the Town Hall, Leek.
The lowest or any Tender will not necessarily be accepted.
By order,
C. HENSHAW,
Clerk.
Town Hall, Leek, Sept. 27, 1904,

COUNTY BOROUGH OF SALFORD.
(GAS DEPARTMENT.)
THE Gas Committee invite Tenders for the purchase of about 1100 Tons of SPENT OXIDE.
Further Particulars and Form of Tender may be obtained on application from Mr. William W. Woodward, Engineer, Gas Offices, Bloom Street, Salford.
Sealed Tenders, endorsed "Tender for Spent Oxide," addressed to the Chairman of the Gas Committee, Town Hall, Salford, to be sent to me not later than Three p.m. on Thursday, the 13th of October, 1904.
L. C. EVANS,
Town Clerk.
Town Hall, Salford, Sept. 30, 1904.

DANISH GAS COMPANY.
NOTICE is Hereby Given, that the FIFTIETH ANNUAL ORDINARY GENERAL MEETING of this Company will be held at the Offices of the Company, 13, Victoria Street, Westminster, on Thursday, the 27th day of October next, at Two o'clock for the following purposes—viz:
1—To receive the Report of the Directors and the Accounts for the Year ended June 30, 1904.
2—To Declare a Dividend.
3—To elect a Director.
4—To elect Auditors for the ensuing Year.
By order of the Board,
H. G. WARREN,
London Agent.
13, Victoria Street,
Westminster, S.W.
Oct. 1, 1904.

ISSUES BY AUCTION OF GAS AND WATER STOCKS AND SHARES.

MR. ALFRED RICHARDS begs to notify that his ISSUES by AUCTION under PARLIAMENTARY POWERS of STOCKS and SHARES in LONDON, SUBURBAN, and PROVINCIAL GAS and WATER COMPANIES take place PERIODICALLY at the Mart, TOKENHOUSE YARD, E.C.

Terms for Issuing such Capital, and also for including Gas and Water Stocks and Shares belonging to Private Owners in these Periodical Sales, can be obtained on application at MR. ALFRED RICHARDS' OFFICES, 18, FINSBURY CIRCUS, E.C.

By order of the Directors of the
SOUTHEND WATER-WORKS COMPANY.

NEW ISSUE OF 2500 NEW ORDINARY FIVE PER CENT. MAXIMUM £10 SHARES.

MR. ALFRED RICHARDS will Sell the ABOVE BY AUCTION, at the Mart, Tokenhouse Yard, E.C., on Tuesday, October 18, at Two o'clock, in Lots.

Particulars of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

By order of the Directors of the
BARNET DISTRICT GAS AND WATER COMPANY.

NEW ISSUE OF £6000 "D" CAPITAL GAS STOCK.

MR. ALFRED RICHARDS, will Sell the ABOVE BY AUCTION, at the Mart, E.C., on Tuesday, Oct. 25, at Two o'clock, in Lots.

Particulars of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

By Order of the Directors of the
LOWESTOFT WATER AND GAS COMPANY.

NEW ISSUE OF 400 ADDITIONAL ORDINARY £10 SHARES, AND £1000 FOUR PER CENT. PERPETUAL DEBENTURE STOCK.

MR. ALFRED RICHARDS will Sell the ABOVE BY AUCTION, at the Mart, E.C., on Tuesday, Oct. 25, at Two o'clock, in Lots.

Particulars of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

By order of the Directors of the
SOUTH ESSEX WATER-WORKS COMPANY.

NEW ISSUE OF £5000 ORDINARY STOCK.

MR. ALFRED RICHARDS will Sell the ABOVE BY AUCTION at the Mart, E.C., on Tuesday, Oct. 25, at Two o'clock, in Lots.

Particulars of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

BRISTOL WATER-WORKS COMPANY.

SALE OF ORDINARY STOCK.

MESSRS. ALEXANDER, DANIEL, AND CO. will SELL BY AUCTION, at the Bank Auction Mart, Corn Street, Bristol, on Thursday, Oct. 20, 1904, at Three o'clock in the Afternoon,

£15,000

BRISTOL WATER-WORKS 7 PER CENT. MAXIMUM CONSOLIDATED ORDINARY STOCK, in Lots of £100,

At the reserved price of £147 for every £100 Stock.

The above £15,000 Stock is part of the 7 per cent. Maximum Consolidated Ordinary Stock, amounting to £970,000, created under the powers of the Bristol Water-Works Acts, 1888, 1889, 1895, and 1902.

The Dividend is subject to proportionate diminution whenever the Maximum Dividend to which each class of Ordinary Shares or Ordinary Stock of the Company is entitled shall not be paid in full; but such diminution may be made up in subsequent years.

For further Particulars and Conditions of Sale apply to the AUCTIONEERS, Bank Chambers, Corn Street, BRISTOL; to MESSRS. EDWARD GERRISH AND CO., Lloyds Bank Buildings, Corn Street, BRISTOL; or to

ALFRED J. ALEXANDER,
Secretary and General Manager.

Bristol Water-Works Office,
Telephone Avenue, Bristol.

To Trustees and Others.—By order of the Directors of
THE CROYDON GAS COMPANY.

SALE OF £2500 FIVE PER CENT. AND £5000 FOUR PER CENT. PERPETUAL DEBENTURE STOCK.

HOOKER and WEBB have received instructions to SELL BY AUCTION, at the Mart, Tokenhouse Yard, E.C., on Tuesday, 1st November, 1904, at Two o'clock precisely, in 82 Lots,

£2500 FIVE PER CENT., and £5000 FOUR PER CENT. PERPETUAL DEBENTURE STOCK of the Croydon Gas Company. The Reserve and Insurance Funds at Midsummer last amounted to £44,522 8s. 11d. The paid-up Ordinary Capital at that date was £310,000, whereas the Debenture Stock then issued amounted to £37,500, thus showing that the stock now offered is a security of the highest class.

Particulars and Conditions of Sale may be had of the Secretary, at the Offices of the Company, Katharine Street, Croydon; at the Mart, E.C.; and of Messrs. HOOKER & WEBB, Auctioneers and Surveyors, 4, High Street, CROYDON.

BUENOS AYRES (NEW) GAS COMPANY, LIMITED.

NOTICE is Hereby Given, that the Directors have this day declared an Interim Dividend at the rate of 6 per Cent. per annum for the Six Months ending June 30, 1904 (being 6s. per Share), free of Income-Tax, payable on and after the 20th prox.; and Notice is Hereby Further Given to holders of Share Warrants to Bearer of this Company, that Coupon No. 29 will be paid by the Company's Bankers, The Union of London and Smiths Bank, 50, Cornhill, E.C., on and after the 20th prox., at the rate of 6s. per Coupon.

Coupons must be left with the Bankers three clear days for examination.

THE TRANSFER BOOKS WILL BE CLOSED from the 7th to the 20th of October, both days inclusive.

By order,
J. M. MACMORRAN,
Secretary.

1, East India Avenue,
Leadenhall Street, E.C.
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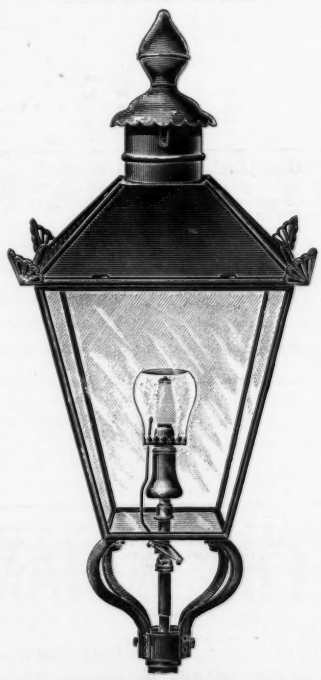

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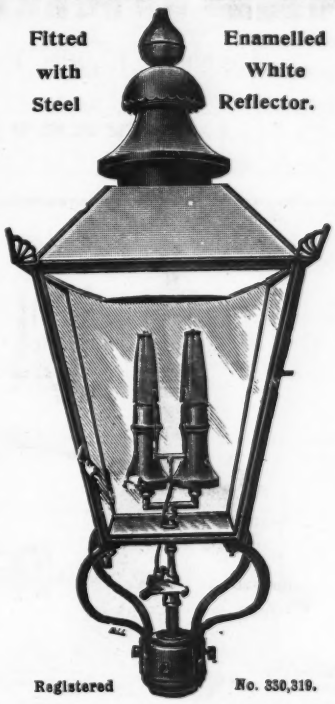

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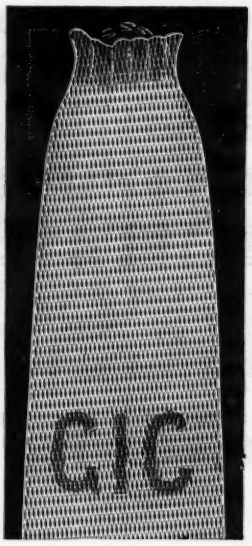

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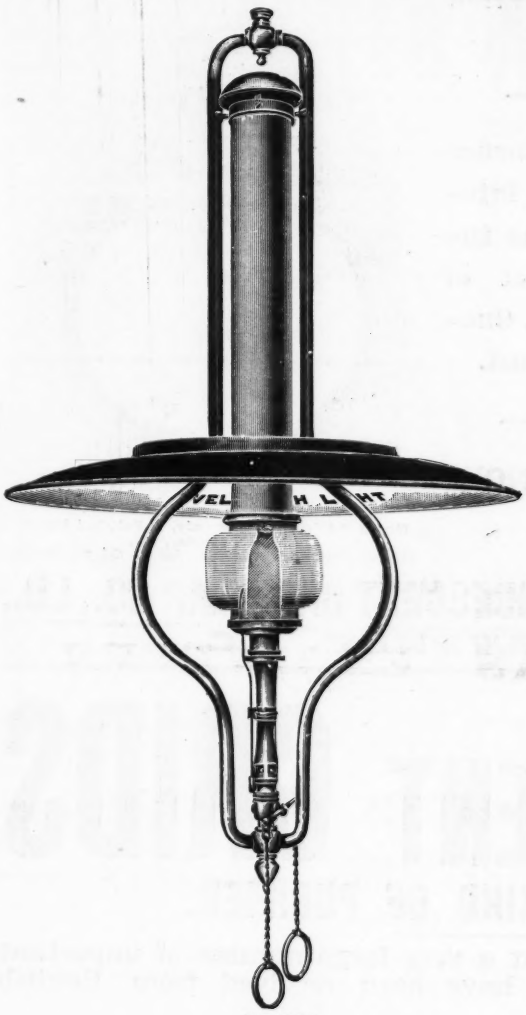

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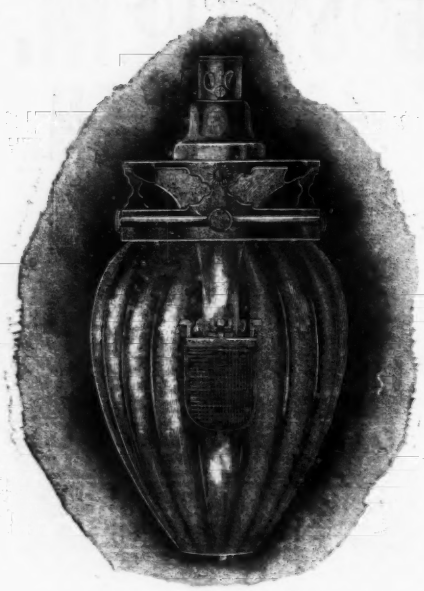

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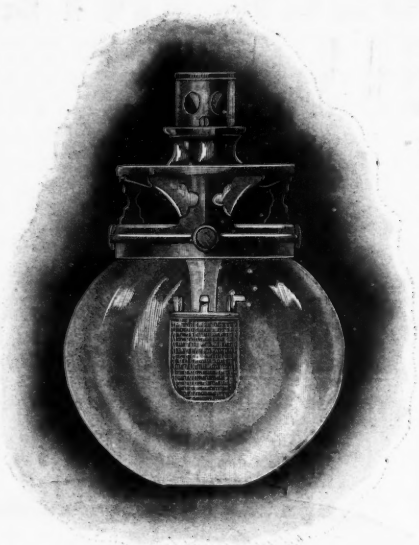

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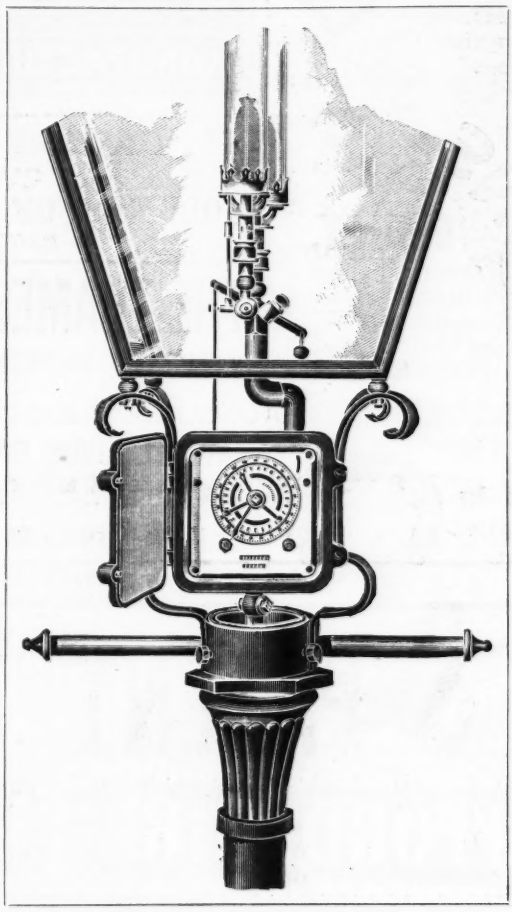

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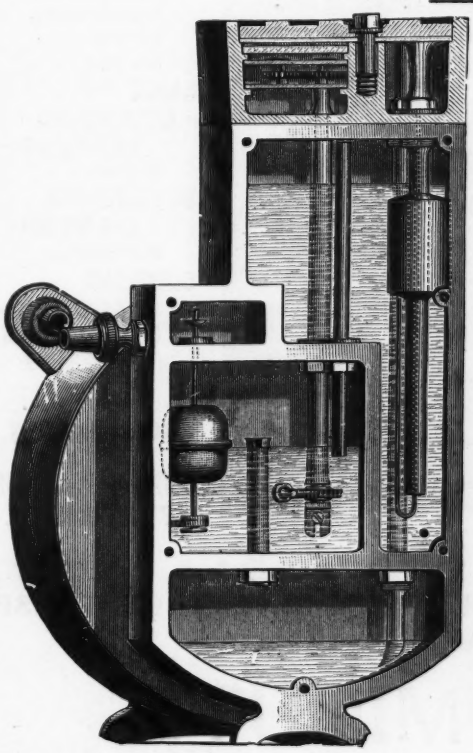

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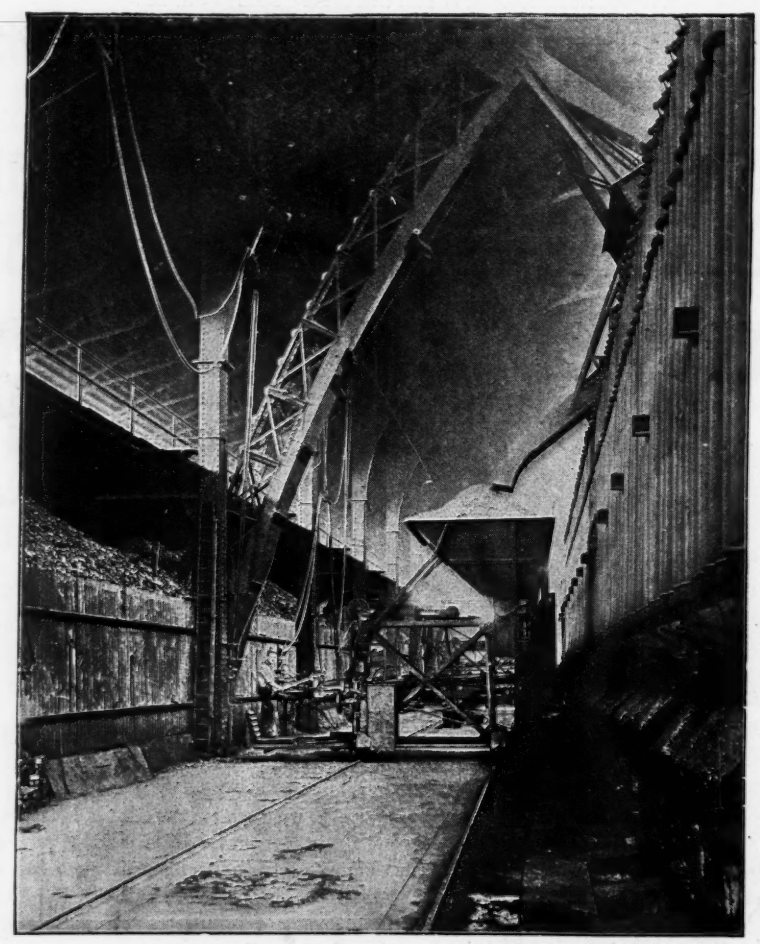

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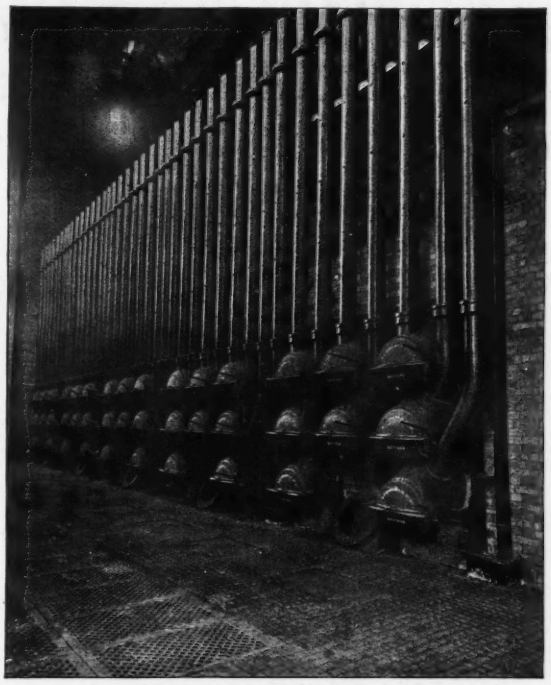

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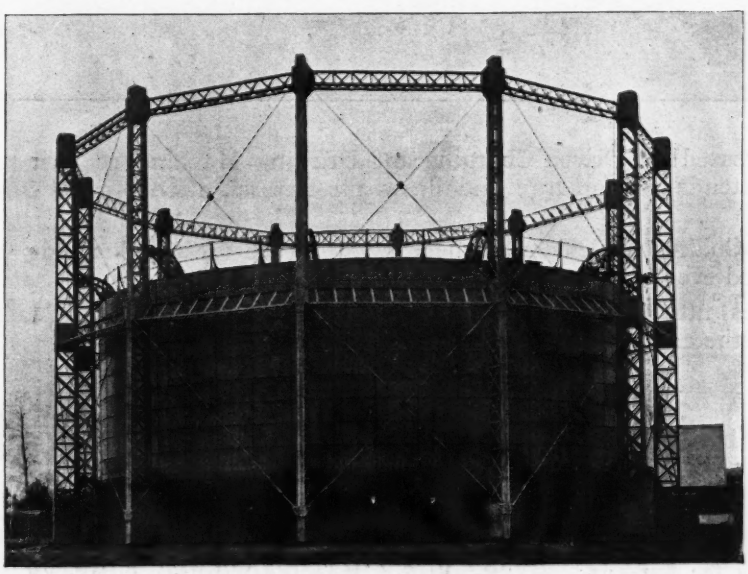

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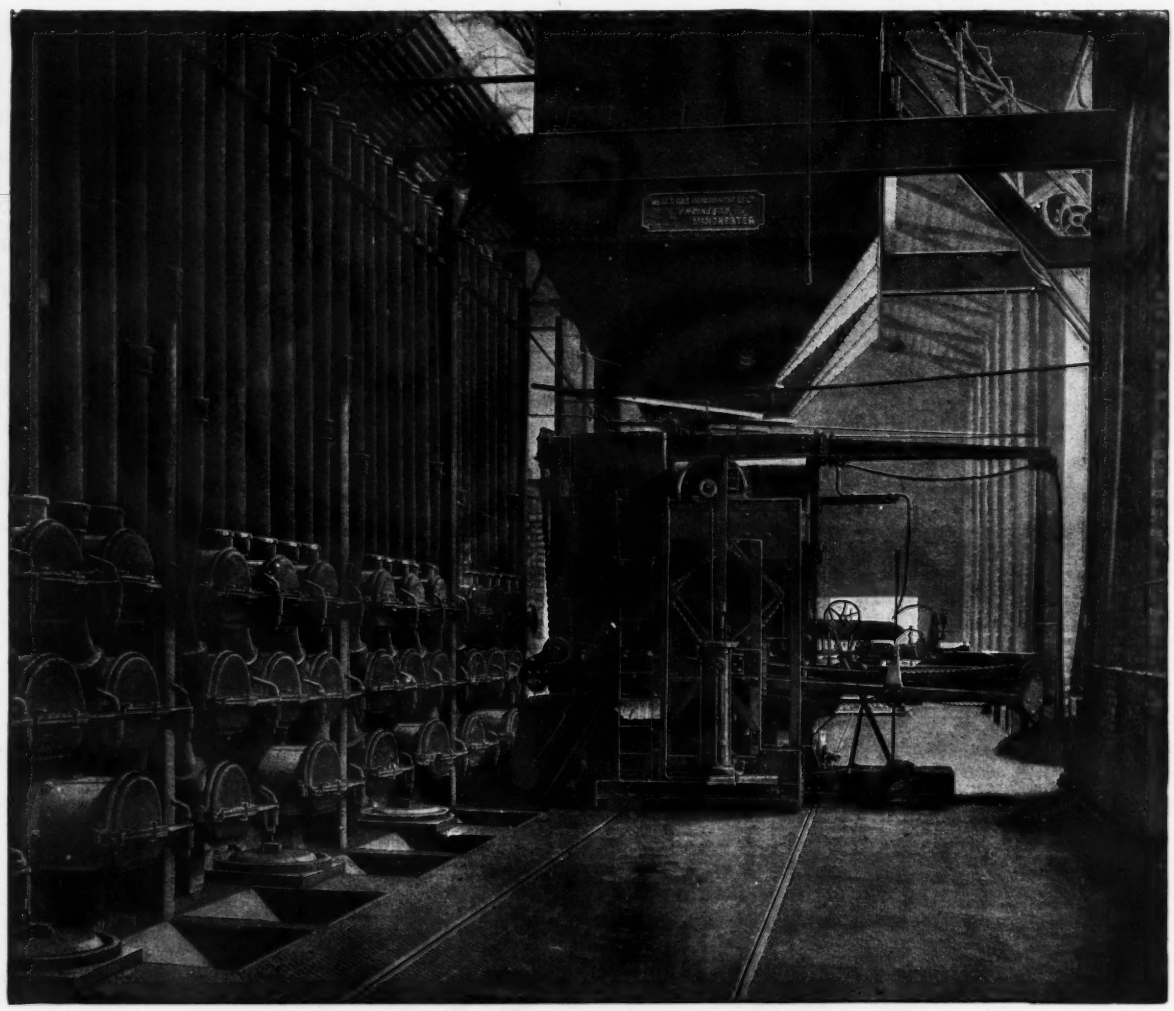

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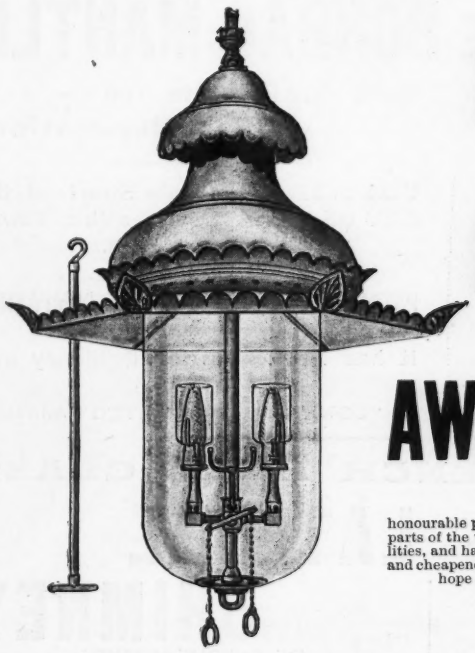

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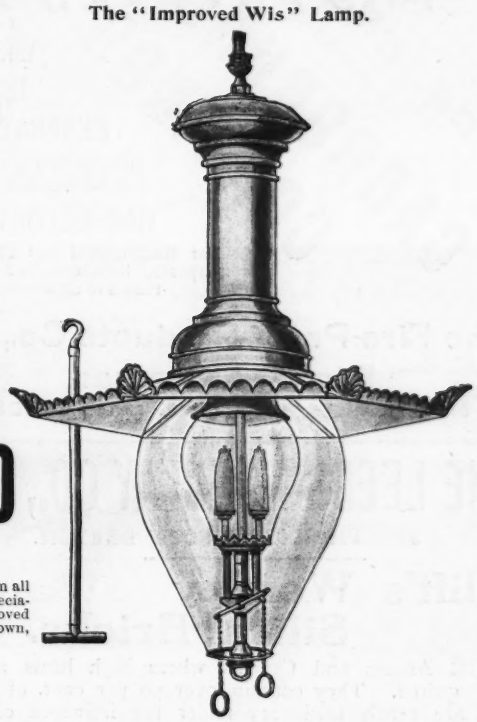

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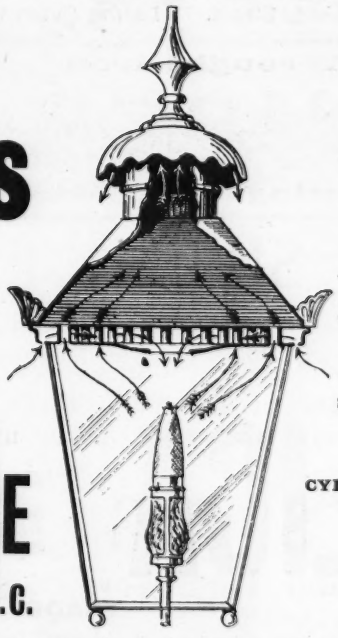

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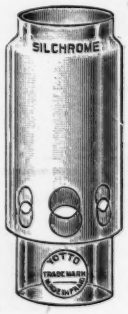

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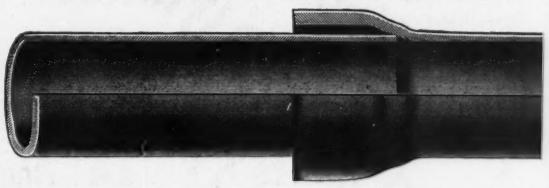

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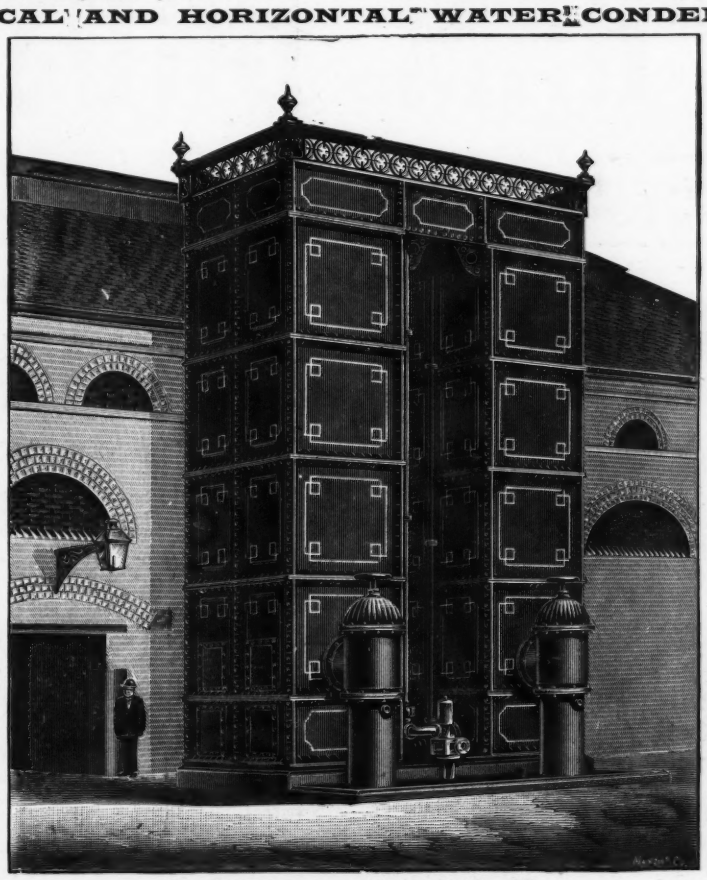

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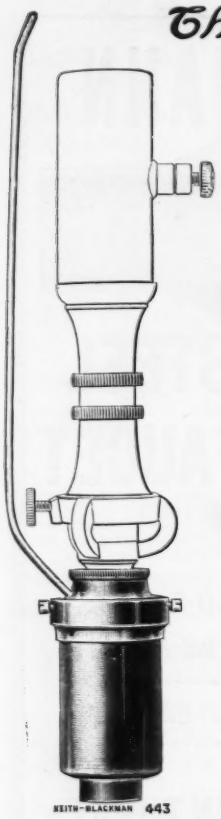

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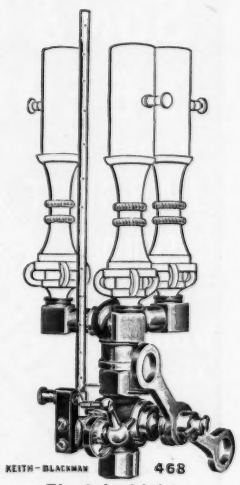

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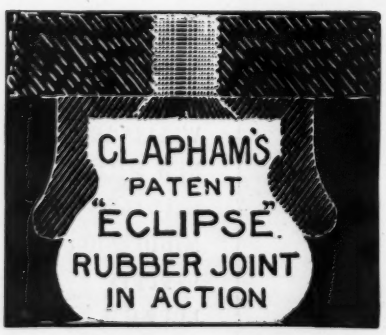

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